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H. Coombs	"Canada: The Evolution of a New Canadian Way of War"	in Stephen Grenier and Gale Mattox, eds.. The Politics of Alliance: Coalition Challenges in Afghanistan (Redford City, CA: Stanford University Press. 2015)
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H. Coombs	"Perspectives on Canadian Armed Forces Leadership in 21st Century Whole-of-Government Operations"	in Commander Dave Woycheshin, ed., In Harm's Way – The Comprehensive Approach: Perspectives from the Field (Kingston: Canadian Defence Academy Press, 2015)
Yon Hlatky & H. Breede	"Going to War?"	(Montreal and Kingston: McGill-Queen 's U P. 2016)
H. Breede	"Defining Success: Canada in Afghanistan"	American Review of Canadian Studies 44. no 4 (2016)
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DAIP NOTE: This list was provided to inform the requester of publically available research on the topic. Theses documents are not contained within the request.

The Army Lessons Learned Centre

DISPATCHES

LESSONS LEARNED FOR SOLDIERS

Military Engineers in Afghanistan

Vol. 18, No. 2, June 2016

National Defence | Défense nationale

Canada

LESSONS LEARNED FOR SOLDIERS

Military Engineers

in Afghanistan

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Disclosure Statement

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DIRECTOR ROYAL CANADIAN ENGINEERS

Military Engineer operations in Afghanistan represented the culmination of previous decades of Cold War training and peace support operations. The changing situation and unique environment of Afghanistan provided harsh and unforgiving conditions for the conduct of engineer operations. Moreover, it allowed us to learn, as well as refine, much about how we fight and support combat.

This *Dispatches* covers a wide breadth of engineer-related topics, but it does not cover them all. The primary area of focus was our combat engineer experiences in the Kandahar region. Despite that, the contributions of Engineers throughout the entire Canadian Military Engineer Branch are mentioned or acknowledged wherever possible. "Military Engineers in Afghanistan" represents the collaboration of many different contributors who are to be commended for giving unstintingly of their time in the research contributing to this report.

After reviewing this *Dispatches*, one will see that significant lessons have been identified through Canada's experience in Afghanistan. As a result of this campaign, our ability to operate in the current and future security environments has advanced considerably. It is now up to all of us to ensure that these lessons identified become lessons learned.

CHIMO!

J.E. Goodman
Colonel
Director Royal Canadian Engineers

The Army Lessons
Learned Centre

DIRECTOR ARMY LESSONS LEARNED CENTRE

The Commander of the Army and Commander CADTC recognized the need to record the main lessons identified and lessons learned from the Army's collective experience of operations in Afghanistan before those memories disappear. As such, it was directed that a series of *Dispatches* be dedicated to capturing the major lessons from our Kandahar operations by Corps and Capability.

The Royal Canadian Artillery Corps published the first of the series in 2011, followed by Combat Service Support and the Royal Canadian Infantry Corps in 2014 and the Royal Canadian Armoured Corps in 2015. This edition of *Dispatches* is the fifth in the series and is dedicated to capturing the main lessons garnered by Canada's Military Engineers while operating in southern Afghanistan. Military Engineer operations in Afghanistan spanned the full spectrum of conflict, challenging Engineers to continuously adapt to achieve success in a variety of missions—from humanitarian assistance through stabilization to combat. The insights offered in this review capture some of that experience and are crucial to ensure that the Army "advances with purpose" by building on our operational experience.

R.C. Rankin
Lieutenant-Colonel
Director

TABLE OF CONTENTS

"It is a misconception to assume that warfare lessons can be learned only on the battlefield. A great deal can be learned from study and training.[1]"

—CANADIAN ARMY MANUAL OF TRAINING: THE FIELD SQUADRON IN THE INFANTRY BRIGADE GROUP (1960)

PART 1 – INTRODUCTION

Canadian commitment to a brief combat mission in Kandahar during 2002 was followed by participation in a 2003–2004 stabilization[2] intervention, oriented on Kabul. This initial intervention was, in turn, trailed by provincial reconstruction and gradually escalated to a deadly low-intensity conflict in southern Afghanistan in 2006, which eventually cost Canada 162 lives.[3] In 2011, Canada's role transitioned from fighting, primarily in Kandahar, to providing advice and assistance within the North Atlantic Treaty Organization Training Mission – Afghanistan (NTM-A), with the preponderance of her forces once again located centrally in the region of Kabul. This advisory mission ended in 2014. Throughout these years, the engineer efforts in Afghanistan reflected the nature of the conflict—constantly evolving and involving a myriad of military and non-military agencies. Command and control, organizations, roles and employment, policies and procedures, equipment and material, as well as individual and collective training, were all affected over the course of Canada's commitment. This narrative primarily focuses upon Canadian military engineers during the years of the most intense fighting, from 2006 to 2011.[4]

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1. Canada, Department of National Defence, Canadian Army, *Canadian Army Manual of Training: The Field Squadron in the Infantry Brigade Group* (Ottawa: Army Headquarters, 1960), 1.

2. Stability activities are "tactical activities conducted by military forces in conjunction with other agencies to maintain, restore, or establish a climate of order within which responsible government can function effectively and progress can be achieved". (Army Terminology Panel)

3. Janice Gross Stein and Eugene Lang, *The Unexpected War: Canada in Kandahar* (Toronto, ON: Penguin Group (Canada), 2007; reprint 2008), 244–45; and between 2002 and 2011, 158 members of the Canadian Armed Forces and 4 Canadian civilians were killed. These latter numbers include one diplomat, one journalist and two aid workers. "Afghanistan: In the line of duty: Canada's casualties (last updated 31 October 2011)," *CBC News*, available at http://www.cbc.ca/news/background/afghanistan/casualties/list.html; Internet, date accessed 6 March 2013, n.p.

4. The primary themes of this work are taken from information provided by officers commanding field squadrons, Lieutenant-Colonels Chris Ayotte and Don Hilton (Rotation 0), Major Trevor Webb (February to September 2006 / Task Force 1-06), Lieutenant-Colonel Mark Gasparotto (July 2006 to March 2007 / Task Force 3-06), Lieutenant-Colonel Jake Galuga (January to August 2007 / Task Force 1-07), Lieutenant-Colonel Walter Taylor (July 2007 to March 2008 / Task Force 3-07), Major Nathan Packer (January to September 2008 / Task Force 1-08), Major Matthew Sandy (September 2008 to April 2009 / Task Force 3-08), Major Trevor Friesen (October 2009 to April 2010 / Task Force 3-09), Major Jim Smith (April to October 2010 / Task Force 1-10), and Major François Sauvé (November 2010 to July 2011 / Task Force 3-10). Also, Task Force Engineers Colonels Jacques O'Keefe, Alan Mulawyshyn, Jennie Carignan, and Mark Misener, Lieutenant-Colonel Stewart Beal, Majors Steven Arthurs and Paul Hurley, plus Commanding Officer TFK Engineer Regiment, and Mission Transition Task Force Engineer, Major Carol Sawatzky. I would also like to thank Lieutenant-Colonel Alain Carrier, Majors John Hayward and Ken McRae, in addition to Master Warrant Officer Aret Akcakiryan, who first collated the lessons learned observations, as well as Lieutenant-Colonel Lee Goodman and Mr. Cohn Odding of Canadian Joint Operations Command who provided the information necessary to document the activities of non-field engineers, the theatre activation and closure, in addition to key engineer operations throughout the war. My gratitude for editing assistance goes to Colonel Jim Goodman, Lieutenant-Colonel Don Saunders, Major Scott Craft, and Ms. Lindsay Coombs. Finally, the unstinting help and support given to this project by Lieutenant-Colonel Ken Holmes (Retired), Canadian Military Engineer Historian, was without parallel and instrumental in the completion of this project.

This group not only consisted of the Army's combat engineers, its "sappers," who as of 2013 became known as the Royal Canadian Engineers (RCE), but also included military engineers from a variety of backgrounds and services. This representation of all engineers was even more evidenced during the theatre activation of Kandahar in 2005–2006 and its closure in 2011. Ultimately, this work is an effort to ensure, as noted in the opening quote, that the hard-won knowledge gained in Afghanistan is captured for the use of future generations of Canadian military engineers.

From 2006 to 2011, Canada's military engineers not only contributed to combat operations, but also contributed to the integrated, Canadian, whole-of-government approach, enabling the efforts of all field partners—Afghan, Canadian and allied. These whole-of-government-related engineer activities evolved over time and, by 2009, drew principally on organizations that were under the control of the task force engineer—the senior engineer officer for Task Force Kandahar (TFK)[5] who was responsible for all engineers in the theatre and who, in 2009–2010, also became the commanding officer of the TFK Engineer Regiment. That reorganization, and the reasons underpinning it, will be explored in detail later in this narrative. Unlike the

5. TFK will be used throughout this monograph to denote the Canadian brigade-level formation supporting the International Security Assistance Force (ISAF) mission in Kandahar Province as part of Regional Command South from 2006 to 2011. This organization included all Canadian Army units in southern Afghanistan.

combat engineers supporting the battle group or task force[6] who were focused on fighting the insurgent directly, the other engineer elements, in particular the Construction Management Organization (CMO) and the Specialist Engineering Team (SET), concentrated on combatting the insurgency indirectly through capacity-building efforts, part of which included the hiring of "fighting-age males."[7] The CMO was accountable for executing security and development-oriented building projects and employing resident fighting-age males through local employment programs (LEP). The SET, on the other hand, provided technical assistance to development efforts focused on high-visibility as well as complex projects that could be executed through local contractors but that could not be brought to a successful conclusion by low-skilled, labour-based solutions.[8]

Nonetheless, before elaborating the story of the counterinsurgency fought directly and indirectly by all engineers in southern Afghanistan, it is necessary to start at the beginning.

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6. The term "battle group," rather than task force, will normally be used to describe a unit structured for independent operations that usually has over 1,000 personnel in order to avoid confusion with TFK.

7. Telephone interview with Colonel Jennie Carignan, 14 November 2014. [Notes in possession of author]

8. More detailed information concerning the non-combat-related aspects of the engineer experience in Kandahar is contained in Canada, Department of National Defence, Land Force Central Area, "Theatre Lessons Learned Report (TLR) 09/034 Engineers Support to Stability Operations (COIN) Joint Task Force Afghanistan TFK 5-09 Afghanistan 2009," November 2009.

PART 2 – THE MOVE FROM KABUL TO KANDAHAR, 2005–2006[9]

In 2005, Task Force Afghanistan deployed to what was then the hub of Canadian operations, Camp Julien in Kabul, as part of the ISAF. One of their primary roles at the time was providing support to the Afghan national elections. Simultaneously, between October and November 2005, in response to the decision to undertake a national PRT, the task force moved to Kandahar Airfield (KAF), located south of Kandahar City, Kandahar Province, southern Afghanistan. KAF had been the site of Canada's original 2001–2002 basing of an infantry battle group within an American brigade. The 2005–2006 period was an extremely busy time, with military support to the elections that were occurring in Kabul, the transition and activation of KAF as a base for Canadian operations in the south, as well as the organization and enlargement of the Canadian presence in KAF. The physical infrastructure of the KPRT located at Camp Nathan Smith (CNS) established in Kandahar City was also enlarged and occupied by the Canadian PRT. Throughout the course of those affairs, both general and close engineer support was continually provided to the task force and, simultaneously, the intermediate staging base at Camp Mirage received continued engineer support from its dedicated engineer flight.

As a result, the study of the move to KAF bears much more scrutiny than will be dealt with in this report. It is a story of activating a theatre while simultaneously supporting operations. The expansion of KAF Task Force Holdfast was formed from engineers within the theatre, as well as individual[10] and unit augmentation. It was a joint operation involving engineers of all services. Its headquarters was based on that of the in-theatre 24 Field Squadron and, moreover, Task Force Holdfast had a wide range of capabilities. It included a Composite Troop that possessed both field engineer and heavy equipment capabilities. There was an explosive ordinance disposal (EOD)/ improvised explosive device (IED) capability, but the latter was not considered a primary task as the bulk of its work was conducted within the confines of KAF. An Engineer Support Unit (ESU) that provided about the same new construction ability as that of a major base in Canada was included. The ESU was drawn from the National Support Element (NSE) that had been at Camp Julien and, unfortunately, did not have a great degree of organizational depth. There was a SET that provided engineer design support to the KAF enlargement. During this period, there were two consecutive SET rotations from 1 ESU, Moncton.[11] The ongoing existence of this capability proved to be vital to efforts of the KPRT during the capacity-building operations of later years. Also included was a Construction Troop of Airfield Engineers from 191 Airfield Construction Troop, 191 Airfield Engineer Flight (AEF), 19 Wing, Comox, which was augmented by 192 AEF, Abbotsford, an air reserve unit, along with a Pacific Naval Construction Troop (PNCT), Esquimalt, that collectively served with Holdfast from

9. The bulk of this discussion of the move to Kandahar comes from Canada, Department of National Defence, Land Force Central Area, "7600-1 (A Engr) OP ATHENA ROTO 4 / ARCHER ROTO 0 Task Force Engineer Post Operation Report," 26 April 2006.

10. Some key construction engineer tasks were difficult to fill due to a shortage of tradesmen. In particular Electrical Generation System (EGS) and Water Fuel and Environmental (WFE) Technicians proved problematic to source. Canada, Department of National Defence, Land Force Central Area, "7600-1 (A Engr) OP ATHENA ROTO 4 / ARCHER ROTO 0 Task Force Engineer Post Operation Report," 26 April 2006, 6.

11. 1 ESU moved to Kingston in 2013.

January to February 2006. During that time, they completed all vertical[12] construction tasks needed for the Canadian mission. Furthermore, there was an Improved Landmine Detection System (ILDS) Team.[13] During December 2005, the ILDS team, with elements from 1 ESU, Moncton, and 4 Engineer Support Regiment, Gagetown,[14] verified the unexploded ordnance (UXO) clearance conducted by RONCO Consulting Corporation. Finally, this effort was supported by Public Works and Government Services Canada (PWGSC) Koblenz, Germany.[15] This European PWGSC office provided a high degree of support to the construction of infrastructure by enabling large contracts on behalf of Task Force Holdfast. However, despite all the hard work that was done to support the mission, there was a degree of bureaucratic inflexibility, as spending by PWGSC Koblenz was limited to set amounts. Once those limits were exceeded, many back-and-forth exchanges were required with the PWGSC director in Ottawa in order to resolve the issue. It was thought afterwards that future support of this nature might best come from Defence Construction Canada (DCC) and, eventually, that transition did take place.

In general, much was accomplished during that time to prepare KAF for the arrival of Canadian combat forces. It was an incredible amount of work that included constructing and improving infrastructure at KAF and CNS as well as laying the groundwork for continuing engineer support of all types to the departments and organizations involved in the Canadian mission. The amount of contracting that was undertaken foreshadowed the financial capability that would be needed in upcoming years. As with all operations, those activities were not without points of friction. Surprisingly, early reconnaissance efforts did not include engineer representation and, correspondingly, greatly limited early examination of engineer issues, particularly pertaining to existent infrastructure at KAF and the ability of allied forces to provide ongoing infrastructure support. In a matching fashion, the need for engineer-specific planning to open the KPRT, establish the initial presence at KAF and close Camp Julien was underestimated and much valuable time was lost by the magnitude of those activation tasks. The absence of relevant engineer advice, provided in a timely manner, would continue to plague the deployment.

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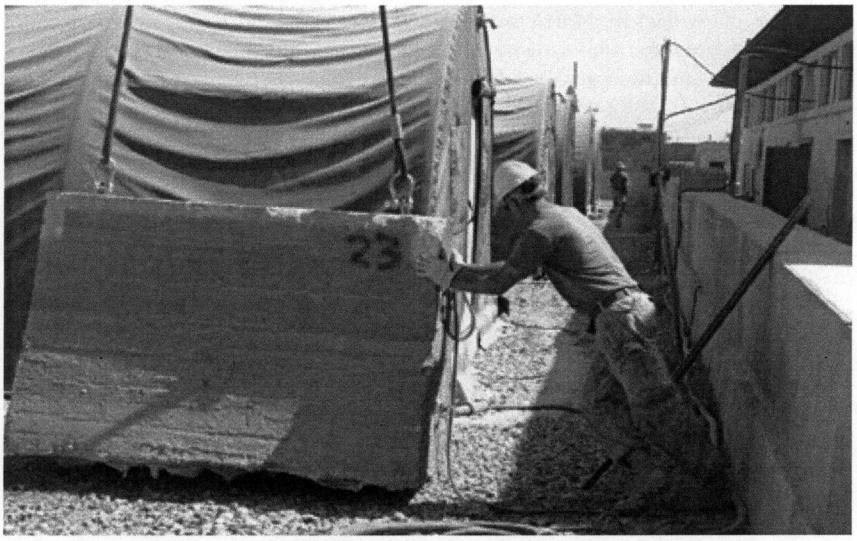
12. New from the ground up.

13. "The 'Improved Landmine Detection System' uses four distinct sensor technologies: metal detection, infrared thermal imaging, ground-penetrating radar, and 'TNA' or thermal neutron activation detection." *Canadian American Strategic Review*, "Canadian Forces Landmine Detection and Mineclearing—November 2004," available at http://www.casr.ca/id-ilds-landmine-detection-2.htm; Internet, accessed 29 September 2014, n.p.; and, "The Canadian Forces 'Improved Landmine Detection System' (ILDS) entered service in 2004, its first operational deployment being to Afghanistan. ILDS is a multi-sensor, tele-operated detection and mineclearing system comprised of three vehicle types–the remotely-controlled detection and clearing Protection Vehicle (or PV, sometimes referred to as the "Proving Vehicle"), the smaller Remote Detection Vehicle (or RDV), and the Control Vehicle which houses the single control console for the PV and twin consoles for the RDV. Combat engineers in the CV control the remote vehicles from a safe distance (up to 2 km away) by radio signal. Remote vehicles work in sequence." *Canadian American Strategic Review*, "Canadian Forces Landmine Detection and Mineclearing—November 2004," available at http://www.casr.ca/id-ilds-landmine-detection-1.htm; Internet, accessed 30 October 2014, n.p.

14. E-mail from Colonel Jacques O'Keefe to Howard G. Coombs dated Friday, 21 November 2014, 06:02 AM, n.p. [In possession of author]

15. The PWGSC office in Koblenz gave the Government of Canada the ability to obtain goods and services, as well as facilitate assets disposal outside Canada. Its primary role was to assist the deployed operations of the DND. Canada, Government of Canada, Public Works and Government Services Canada, "PWGSC Koblenz Office," available at http://www.tpsgc-pwgsc.gc.ca/app-acq/stamgp-lamsmp/coblence-koblenz-eng.html; Internet, accessed 29 September 2014, n.p.

As always in engineer operations, provision of appropriate quantities and types of equipment proved challenging—this became a re-occurring theme throughout the mission. While the engineers in Kabul had been provided with adequate amounts of heavy equipment, no additional heavy equipment was available to support Task Force Holdfast and, as a result, local leasing was the only option. Unfortunately, local equipment was of such poor quality that its reliability was always in question and that had an associated impact on the conduct of engineer work. Critical engineer equipment shortages occurred regularly over the course of the deployment, and this had an impact on activities.



Source: Combat Camera IS2005-1247a

Sergeant Wayne Brown, an Engineer from 1 Engineer Support Unit based out of Moncton, New Brunswick, positions a cement block in Kandahar, Afghanistan. Sgt Brown is deployed as a member of the Activation Team.

Command and Control Relationships

It is interesting to note that an issue that continuously re-emerged during this period was the lack of clarity in the engineer command and control relationships. This defined engineer command and control relationship was necessary to provide for a unity of command and effort. Correspondingly, the absence of clarity in those affiliations fundamentally altered the context of the work that went on in Kandahar. During this period of theatre activation, the ESU and the engineer aspects of the support provided by the CF Contractor Augmentation Program (CANCAP)[16] were under command of the NSE, while the engineers in Kabul had technical control. As a result of that, there was a fair degree of separation created between the command of engineers held by the NSE and the technical control of the engineer leadership.

16. CANCAP is a joint venture of SNC-Lavalin PAE Inc. and PAE (Pacific Architects and Engineers) Government Services Inc. SNC-Lavalin PAE Inc. "Welcome to SNC-Lavalin PAE Inc.," available at http://www.snclavalinpae.com/en/default.aspx; Internet, accessed 29 September 2014, n.p.

Resultantly, the priorities of the NSE did not always mirror that of the engineers. In the final analysis, in engineer operations, technical control is meaningless without the authority to wield it effectively and efficiently.

Accordingly, a concluding thought from the experience of Task Force Holdfast was that the "long established principles of employment of engineers such as centralized control, decentralized execution, prioritization of work, early warning and continuity of effort applied fully in this mission. Where they were not followed, problems occurred."[17]

Concurrently, the KPRT—which at that time was more so a vanguard for the first combat rotation rather than the whole-of-government construct that it was to later become—was comprised of a headquarters, an infantry company, a combat service support company, civil–military cooperation elements, some representatives from supporting government departments and an engineer field squadron. This latter sub-unit, 13 Field Squadron from 1 Combat Engineer Regiment in Edmonton, was deployed as part of the KPRT from July 2005 to February 2006. It was comprised of field engineers, heavy equipment and improvised explosive device detection (IEDD)/ explosive ordnance disposal (EOD) operators, representatives of all engineer trades, communications research technicians, a firefighter, and engineer officers. The squadron was organized with a small headquarters, a composite troop of a field section, two IEDD/EOD teams,[18] and a utilities section. There were also two engineer reconnaissance detachments and a section of patrol engineers. 13 Field Squadron was not replaced at the end of its deployment, although attempts were made near the end of the mission in Kandahar to ensure that there was an engineer staff officer within the KPRT to coordinate engineer matters with the engineers of the task force.[19]

13 Field Squadron was assigned to the KPRT to fulfill common military engineer roles. In addition to improving and maintaining the KPRT tactical infrastructure in Kandahar City at CNS, they provided engineer advice, EOD and search capability, as well as heavy equipment support and tradesmen for specialist tasks. Additionally, the squadron conducted traditional engineer tasks for supporting manoeuvre elements of the KPRT.[20]

Initial Counter-improvised Explosive Device Training

Notably, it was during this period that a number of techniques were learned and refined through contact with the Joint Improvised Explosive Device organization

17. Canada, Department of National Defence, Land Force Central Area, "7600-1 (A Engr) OP ATHENA ROTO 4 / ARCHER ROTO 0 Task Force Engineer Post Operation Report," 26 April 2006, 17.

18. These two teams composed one large section, as those operators had been absorbed from 24 Field Squadron in Kabul when they ceased conducting operations. That allowed 13 Field Squadron to deploy two teams if required but, as noted consistently throughout engineer rotations, the numbers of vehicles and quantities of equipment were limiting factors in the completion of engineer tasks. E-mail from Lieutenant-Colonel Chris Ayotte to Howard G. Coombs dated Thursday, 8 January 2015, 11:16 AM, n.p. [In possession of author]

19. E-mail from Lieutenant-Colonel Chris Ayotte to Howard G. Coombs dated Tuesday, 4 November 2014, 6:51 PM, n.p. [In possession of author]; and e-mail from Colonel Derek Basinger to Howard G. Coombs dated Tuesday, 11 November 2014, 6:54 PM, n.p. [In possession of author]

20. E-mail from Lieutenant-Colonel Chris Ayotte to Howard G. Coombs dated Thursday, 8 January 2015, 11:16 AM, n.p. [In possession of author]

formed from the United States Counter-Explosives Exploitation Cell (CEXC) based at KAF. It was a combined organization of American military personnel and contractors. Many of the latter were former military, particularly from special operations. In the lead-up to the KPRT mission, during the reconnaissance and short pre-deployment training phase, and throughout the deployment, the CEXC provided counter-improvised explosive device (C-IED) information, tactics, techniques and procedures (TTP), as well as training. 13 Field Squadron worked very closely with the CEXC and attribute their assistance in the development of Canadian TTP as a key factor in their low casualty rate. One such TTP known as "fives and twenties" became the standard protective search pattern carried out during operations.[21] Every deployed soldier practised fivemetre and twentymetre drills in training and conducted those drills in theatre.

Also during this time, the ground designation concept evolved. Originally, as a result of the high density of mines left from the Soviet occupation in the vicinity of Kabul, military personnel needed to understand the mine threats prior to conducting missions and tasks. The ground designation concept provided for a deliberate risk assessment during the battle procedure portion of a mission. By examining the terrain from a holistic perspective incorporating current intelligence, any history of IED strikes, mine databases, and any other relevant information, one could determine if the requirement to make use of certain routes or terrain outweighed the potential risk.[22] In the succeeding years of operations in Kandahar, the methodology of the ground designation concept continued to progress in order to meet the changing threat environment.

Information Management – Lessons Retention

While the period leading up to the major combat operations has had little formal examination, it seems evident that most issues identified during this time were reoccurring themes throughout the remainder of the deployment. Plus, this interval also laid the foundation for and shaped subsequent deployments. Taken together, one can only agree wholeheartedly with the Officer Commanding 13 Field Squadron, Major Chris Ayotte, when he commented within his November 2005 "Mid-Tour Report":

> The main reason for production of this report is passage of Engr [engineer] information. The passage of Engr lessons learned from operations has not been good in my experience. We need to keep the information moving between the Regts [Regiments], J3 Engr [Canadian Expeditionary Forces Command], CFSME [Canadian Forces School of Military Engineering], ESU, JOG [Joint Operations Group], MCE [Mapping and Charting Establishment] and the deployed Engr elements. If one or two points from this document help the next sub-unit in the breach then it has been a worthwhile exercise.[23]

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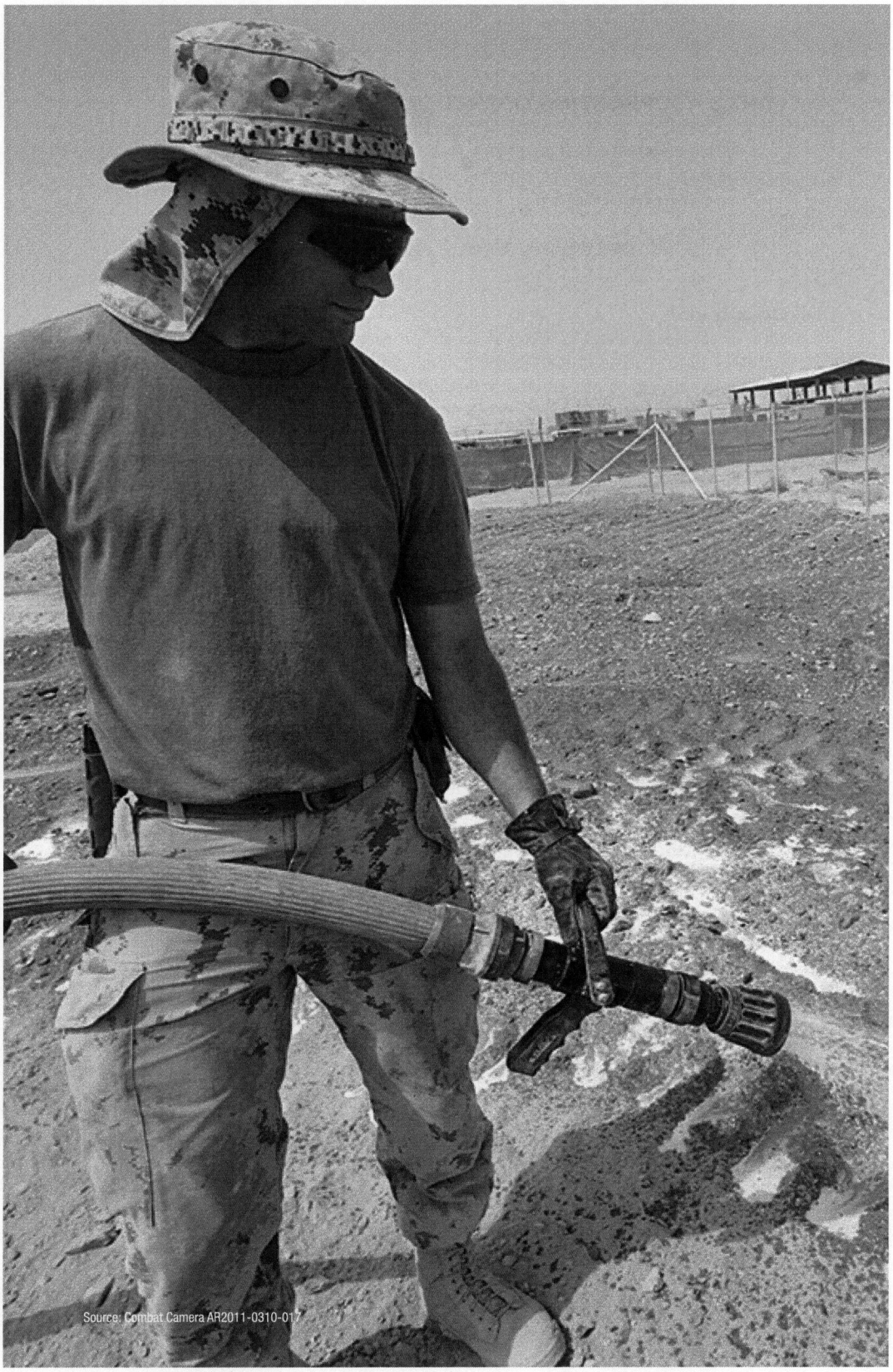
21. E-mail from Lieutenant-Colonel Chris Ayotte to Howard G. Coombs dated Thursday, 8 January 2015, 11:16 AM, n.p. [In possession of author]

22. E-mail from Lieutenant-Colonel Chris Ayotte to Howard G. Coombs dated Thursday, 8 January 2015, 11:16 AM, n.p. [In possession of author]

23. Canada, National Defence, Kandahar Provincial Reconstruction Team, "1000-1 (Engr Ops O) PRT Engr Mid-Tour Report," November 2005, 6/6.



PART 3 – SUPPORTING OPERATIONS, 2006–2011

> "As long as war is fought on the ground, the maintenance of mobility of our forces, and the denial to the enemy of his mobility, will remain a major engineer task in every operation."[24]
>
> —*CANADIAN ARMY MANUAL OF TRAINING: THE FIELD SQUADRON IN THE INFANTRY BRIGADE GROUP (1960)*

Organization

This quote from a Cold War Royal Canadian Engineer publication highlights the timeless nature of engineer roles in land operations. Though the necessity of providing mobility to Afghan, Canadian and other security forces, as well as denying or channelling insurgent manoeuvres, remained incredibly important, the greatest evolution of Canadian military engineers in southern Afghanistan concerned command and control. That latter development encompassed significant changes in the structures of military engineer organizations that facilitated tactical and operational-level engineer tasks over the course of the combat mission.

The initial Canadian engineer commitment to the first combat rotation in 2006 was composed of a number of organizations. There was 11 Field Squadron from 1 Combat Engineer Regiment, Edmonton, which provided all engineering support to the 1st Battalion, Princess Patricia's Canadian Light Infantry and the KPRT. Also present was the ESU, which was responsible for vertical construction tasks and for providing engineer support to the entire Canadian contingent in Afghanistan. There was also an Airfield Engineer Flight in the United Arab Emirates. Additionally, there were two Engineer Support Coordination Centres (ESCC) deployed. One ESCC was located in the multinational Regional Command (South) Headquarters and the other was in the National Command Headquarters. This original commitment provided the foundation of the force structure evolution that took place over the succeeding years.[25]

Initially combat engineers were not organized within the regimental construct; field squadrons were made part of the deployed infantry battle groups under the authority of the commanding officer. Those field squadrons were multi-capable but found it challenging to accomplish all that was needed from them. For example, 23 Field Squadron, originating from 2 Combat Engineer Regiment, Petawawa, was part of the 1st Battalion, The Royal Canadian Regiment Battle Group, in 2006–2007.

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24. Canada, Department of National Defence, Canadian Army, *Canadian Army Manual of Training: The Field Squadron in the Infantry Brigade Group* (Ottawa: Army Headquarters, 1960), 1.

25. E-mail from Colonel Derek Basinger to Howard G. Coombs dated Thursday, 20 November 2014, 8:42 AM, n.p. [In possession of author]; and, the initial Engineer Support Coordination Centre capability for both headquarters seems to have dissipated sometime after this initial force structure, which had a negative impact on the conduct of operations, and had to be rebuilt at Task Force Kandahar in 2009. Telephone interview with Colonel Jennie Carignan, 14 November 2014. [Notes in possession of author]

The squadron commander, Major Mark Gasparotto, described 23 Field Squadron in his account of that rotation, *Clearing the Way*, as

> ...a multi-national, tri-service, dual-component and combined-arms outfit that included naval clearance divers, electronic warfare operators (Canadian and Australian), Royal Canadian Dragoons, signallers, geomatics technicians, and administrative/logistics staff, all attached to a core of combat engineers. Its role was to create the conditions allowing friendly forces to live, move and fight on an asymmetric battlefield and to deny the same to the enemy. More specifically, it entailed the provision of mobility, counter-mobility, survivability reconstruction and geomatics support to the 1 RCR Battle Group in particular, *but also to the Canadian task force as a whole* [emphasis added]. This mission was accomplished by the explosive ordnance disposal (EOD) operators, heavy equipment operators, armoured engineers, geomatic technicians, combat engineers and various support and headquarters staff that were 23 Field Squadron.[26]

Of great significance was the fact that, in order to employ engineer skills to engineer tasks, vehicles crews from the armoured corps augmented engineer sections. This brought a higher level of expertise to manoeuvering and fighting vehicles and alleviated a shortage of engineers by allowing entire sections to dismount instead of leaving three members behind to fight the Light Armoured Vehicle (LAV) III.[27]

In the complex, wide-ranging environment that was southern Afghanistan, particularly with the low troop density and immense area of operations in the early years, it proved incredibly challenging—if not impossible at times—to support all elements of the battle group with a limited number of field troops. Compounding this demand on engineer expertise and resources was the elimination of the assault pioneer specialty from the infantry prior to the move into southern Afghanistan.[28] After the defeat of massed Taliban forces in fall 2006 during Operation MEDUSA, insurgents moved from mounting conventional operations to guerrilla tactics and, moreover, the weapon of choice became the IED. Interestingly, this was not the first war in which military engineers encountered IEDs; research concerning the Korean War (1950–1952) indicates that Canadian troops faced IEDs during that

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26. "Tri-service denotes personnel originating from the Army, Navy and Air Force. Dual component indicates both Regular and Reserve Force members. Combined Arms indicates two or more combat arms trades grouped together, in this case, Dragoons and combat engineers. Geomatics is the collection, analysis, reproduction and dissemination of all geospatial data and intelligence. More than just map-making, it is used to assist commanders and staff with complete battlefield terrain visualization." Mark Gasparotto, "Introduction," in *Clearing the Way: Combat Engineers in Kandahar – 23 Field Squadron*, Major Mark Gasparotto, ed. (London, Ontario: Ardith Publishing, 2010), 21.

27. Lieutenant-Colonel Mark Gasparotto (July 2006 to March 2007 / Task Force 3-06).

28. "This loss of assault pioneer capability has had more than a theoretical denigration to army capabilities. Lessons learned reports from the Afghan theatre indicate that the presence of assault pioneers in close support of infantry patrols would reduce IED strikes. Additionally, the breaching skills inherent in assault pioneers would be most useful in the breaching of compounds and other fortifications exploited by irregular forces. In short, the loss of assault pioneers has reduced the force capabilities of mobility and force protection." Dave Lambert, "Adapting the Canadian Army Organization: 'Transformation' and the Enduring Nature of Warfare," *Security Challenges* 6, No. 1 (autumn 2010): 49.

conflict.[29] One could believe that that, in combination with the innovative use of mines and explosive devices against Canadian United Nations battalions in the former Yugoslavia during the early 1990s, indicate the permanence of this danger in current and future conflict.

Consequently, as a result of the threat posed by IEDs and mines throughout the entire deployment to Kandahar, engineers were continuously employed on explosive threat hazard and recognition (ETHAR) tasks that were not specific to engineers and that could have been done by pioneers, if they had existed, or in some cases members of the supported units themselves. Training all-arms soldiers in using all-arms equipment could have dealt with some of these requirements. Employment of the all-arms search techniques using the metal detector, low content metal detector (LCMD), explosive detection dogs (EDD) and, in general, most if not all aspects of ETHAR were examples of non-engineer roles that were initially given to the engineers and that could have been made all-arms tasks.

On top of that, supported units learned that when their affiliated sappers did all tasks associated with ETHAR mitigation, more risk accrued to manoeuvre troops as a result of the fact that engineers could not focus on high-threat engineer-specific tasks that were necessary to enable mission success and force protection. Fortunately, as time went on, manoeuvre troops became more habituated with those ETHAR-related tasks. That in turn allowed engineers to provide the necessary support as specific threats were identified. Education and experience were critical in this development and ultimately this growing level of all-arms ETHAR expertise assisted with mitigating the load of the supporting combat engineers.

IEDs and mines, in and of themselves, were the greatest threat to Canadian military personnel in the combat environment. As a result, the need to facilitate mobility and force protection made certain that a great deal of time and effort was spent in the counter-IED (C-IED) fight. Early in the deployment, the danger posed by IEDs and mines was well understood:

> ...elements of the 1 PPCLI Battle Group, including some engineer attachments [11 Field Squadron], had been engaged in an intense firefight with enemy insurgents in a village called Pashmul. Pashmul is located in the Zhari district, 20 kilometres west of Kandahar City on the north bank of the Arghandab River. After a protracted battle, centred on a soon-to-be notorious building known as the "White School," they broke contact, having suffered four killed-in-action (KIA) and several wounded-in-action (WIA). The engagement was notable for two reasons. First, it resulted in the largest number of Canadian soldiers killed in a single combat engagement in many years. Second, it was one of the first times that we had seen the enemy willing to eschew standard guerrilla tactics and dig in to engage coalition forces in a

29. Canadian intelligence reports during the Korean War indicate a number of aspects of unconventional warfare that sappers were to again experience in Afghanistan. These "...encompassed the use of improvised explosive devices (IEDs) by the enemy, the employment of suicide bombers, the incidents of sabotage by enemy agents, and the reports on enemy guerrilla activities." Excerpt from Lieutenant Charles Peng's "Poles Apart: An Examination of Canadian Tactical and UN Strategic Intelligence during the Korean War" (MA thesis, Royal Military College of Canada, 2014), 12.

> conventional battle, using static defensive positions, complete with obstacles on the approach routes (in this case IEDs) covered by direct fire weapons. The enemy contact on August 3rd was an ominous precursor, signalling further engagements that month in both the Zhari and Panjwaii Districts, and [it] would ultimately lead to Operation MEDUSA.[30]

Nonetheless, because of a lack of equipment, the response to IEDs and mines was ad hoc out of necessity. During Operation MEDUSA, Major Mark Gasparotto, Officer Commanding 23 Field Squadron, was forced to arrange to borrow the expedient route opening capability (EROC),[31] a grouping of vehicles that would detect and neutralize IEDs, from American sources. The lack of heavy equipment was not confined to the vehicles needed for EROCs, but also to those for specialized tasks such as breaching. Gasparotto was forced to arrange for the loan of a D6 armoured dozer from the British Army and a D7 dozer from the Afghan Army, and a rental unarmoured D8 dozer. The last was outfitted with steel plating as makeshift armour. Along with that, the squadron's German-made Zettelmeyer,[32] or ZL, was repaired at the last moment and also provided with improvised armour. That became his breaching capability. As Gasparotto observed in his account of 23 Field Squadron's deployment, "Although the dozers were effective, they were ersatz engineer armour—an armoured dozer does not a Badger armoured engineering vehicle make."[33] It was recognized over the years that followed the negative impact of the limited amount of heavy equipment; operators and technicians could only be partially mitigated by centralization and local rental. The latter meant that, in some cases, lower priority tasks and more secure projects could be sub-contracted to local companies. There was simply not enough organic heavy equipment to do everything that was required. Combined with insufficient quantities, the age of the vehicles was also a limiting factor, as parts were often difficult to find or procure when the inevitable breakdowns occurred.[34] In the end, the only answer for future missions seems to be obtaining newer or less used heavy equipment as well as revisiting the scaling of heavy equipment, spare parts, operators and technicians required by Canadian military engineers in non-permissive environments.

Counter-Improvised Explosive Device Equipment

The threat from various forms of IEDs continued to evolve and grow in importance, especially after the defeat of massed insurgent forces during MEDUSA, as did the

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30. Mark Gasparotto, "The Road to High Readiness and Deployment," in *Clearing the Way: Combat Engineers in Kandahar – 23 Field Squadron*, Major Mark Gasparotto, ed. (London, Ontario: Ardith Publishing, 2010), 29–30.

31. American terminology was "route clearance packages" (RCP); and, after the 2 October 2003 Jawz Valley strike, near Kabul, which resulted in two deaths and three injured, Canadian engineers were hesitant to use the word "cleared." Hence the Canadian terminology became "expedient route opening capability." "Opening" can refer to various levels of mitigation—breach, clear, prove, etc. E-mail from Lieutenant-Colonel Mark Gasparotto to Howard G. Coombs, dated Wednesday, 5 November 2014, 10:29 AM, n.p. [In possession of author]; and "Canada in Afghanistan: 2003," *National Post*; Internet, available at http://afghanistan.nationalpost.com/canada-in-afghanistan-2003/, accessed 30 January 2015, n.p.

32. A front-end loader equipped with a bucket.

33. The armoured engineer vehicle (AEV) is also known as the "Badger." Mark Gasparotto, "The Road to High Readiness and Deployment," in *Clearing the Way: Combat Engineers in Kandahar – 23 Field Squadron*, Major Mark Gasparotto, ed. (London, Ontario: Ardith Publishing, 2010), 38–40. Quote from page 40.

34. Lieutenant-Colonel Chris Ayotte (Rotation 0); and Lieutenant-Colonel Mark Gasparotto (July 2006 to March 2007 / Task Force 3-06).

ability of Canada's military engineers to counter it. By the following year, Canadian EROCs were on the roads of southern Afghanistan. These EROCs included eight operators and two team leaders with the ILDS, as well as the vehicles and equipment used to provide expedient road opening capabilities. The EROC team equipment and vehicles included two Huskys,[35] an RG-31 Nyala,[36] and a Buffalo.[37] Initial training for the EROC was done with American engineers in Fort Leonard Wood, Missouri, followed by further exercises in Wainwright, Alberta.

When used in conjunction with one another, they were largely effective; the Husky analyzed suspicious areas and could mark them, and the Buffalo then investigated, using the Nyala to provide security or dismount personnel if a cordon was necessary. Additionally, the ILDS could be used to detonate IEDs that had been found en route, if that was determined to be the method of disposal. This capability was first used to spearhead offensive operations in Zhari in 2007, and variations of this method had also been used during earlier missions in the Balkans.[38] Over the course of several years, these EROCs located and disposed of many IEDs and mines.

The Master Designated Ground Trace and Countering the Improvised Explosive Threat

As part of dealing with the explosive threat, techniques used in prior mission deployments and earlier in the Afghanistan operation once again came to the fore. Once such product that seems to have continually evolved from the ground designation concept used by 13 Field Squadron in 2005–2006 was the master designated ground trace (MDGT), which was a master list of all routes used by the coalition forces. It was typically used as a means of depicting the overall assessment of latent explosive threats along those routes. Typically, each route used by friendly forces would be assigned a designation (normally portrayed with green (Open), yellow (restricted normally with a number indicating restriction) or red (Closed)). Also, MDGTs were used to provide detailed information on routes (width, military load classification, vital points, road surface, type of traffic that could or could not use it, etc.) and the assessed risk along that route.

However, the value of the MDGT for determination of safe routes from an explosive threat perspective was somewhat limited. To be truly effective once the designation was assigned, that route would need constant observation to ensure that the threat situation did not change. Because continuous surveillance on a route was and continues to be nearly impossible to maintain, any designation on a route would only remain valid for the length of time it was under direct observation. Any time that a route was left unmonitored or with gaps due to low light, or it had been poorly observed, it would no longer have a valid, up-to-date designation that could be made with any degree of confidence. It then became necessary for those traveling on a route

35. A mine-resistant ambush protected (MRAP) armoured IED detection vehicle that had a sophisticated sensor platform.

36. A 4x4 MRAP infantry mobility vehicle.

37. An MRAP ordnance disposal vehicle.

38. Details on EROCs taken from Master Corporal Sebastien Gauthier and Sapper Dan LeBlanc, "Making a safe passage for the troops," *The Maple Leaf* 10, No. 38 (5 December 2007); Internet, available at http://army.ca/forums/index.php?topic=72738.0, accessed 29 October 2014, n.p.

to use all-arms search techniques to ensure freedom of movement. Additionally, the MDGT was maintained at TFK but was not always accessible to the field engineer elements in the battle groups or to the battle groups themselves. That was mainly caused by limited information technology hardware or insufficient data bandwidth.[39]

Despite those shortfalls, the true worth of the MDGT lay in generating detailed route and area information to assist commanders in assessing risk and plan operations. If controlled at the highest level, in this case TFK, with each unit responsible for updating the information in their battle space, it provided a useful tool in assisting with all aspects of counterinsurgency operations and assessing the IED threat.

To respond to the constantly changing threat environment and provide a greater degree of dynamic information, a threat tracker and engineer data sheet were developed in later years. They attempted to use information technology to the fullest extent possible. By using a map of the area of operations as the baseline, the engineer data sheet created a series of overlays that tracked data with information derived from all available sources. The engineer data sheet consequently contained all the engineer data that one would expect from the MDGT. Additionally, the threat tracker was a storage location for intelligence. It would track route-based threats against history, reports from the last convoy to travel it, the last time an EROC sweep had passed, and so on. That then led to the development of the EROC patrol matrix as well as assisted those who intended to travel a specific route. Although it was an engineer project, it was recognized by engineer staff that greater integration with the intelligence staff, like in the C-IED effort, would have increased the efficiency of the process.[40]

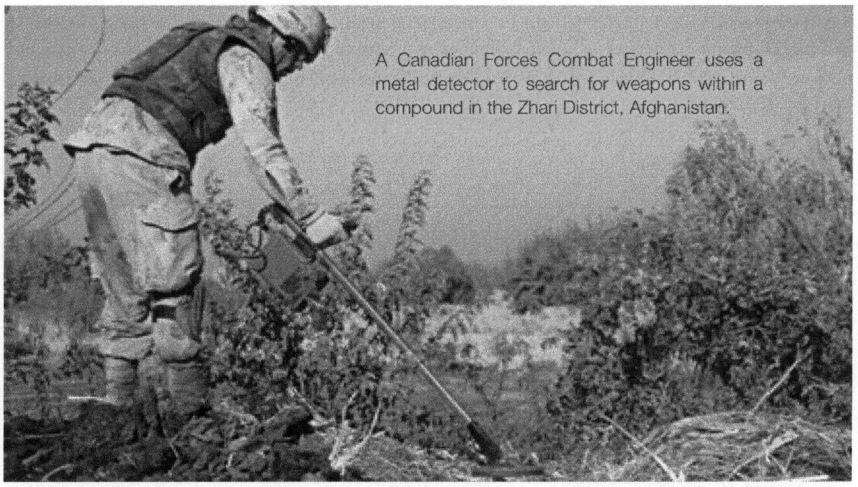
Related to this, it was acknowledged that, like other missions, information was difficult to manage despite the massive increase of deployed information technology capabilities. Data gathered on one rotation seemed to be lost or misplaced by the time it was needed by a successive rotation. For example, from 2006 to 2009, the route and ground data that was collected and collated at the beginning of the Canadian deployment was no longer available three years later.[41] The construction and maintenance of databases as well as the implementation of consistent recording and archiving procedures is something that can be derived from this experience as a lesson learned. Moreover, it seems to apply to all types of information and not just that associated with these products.

Connected to the need for accurate engineer information was the dependency of operations on precise ground information. Digitization, combined with the constant shifting of forces, created an unprecedented requirement for geomatics support and products; the need for both hardcopy maps and electronic planning tools was very high. That eventually necessitated a robust and decentralized execution of geomatics support teams (GST) across TFK, within the headquarters and at the battle group

39. E-mail from Lieutenant-Colonel Mark Gasparotto to Howard G. Coombs dated Wednesday, 5 November 2014, 10:29 AM, n.p. [In possession of author]

40. Major Jim Smith (April to October 2010 / Task Force 1-10).

41. Major Trevor Friesen (October 2009 to April 2010 / Task Force 3-09).



A Canadian Forces Combat Engineer uses a metal detector to search for weapons within a compound in the Zhari District, Afghanistan.

Source: Combat Camera IS2007-686

and the KPRT.[42] By 2010, this decentralized allocation of geo support, necessitated centralized control at the TFK level within an engineer headquarters, and with a chief geomatics technician, in order to prioritize work, eliminate duplication of effort and ensures commonality of datasets.[43]

At the same time, the ability to understand and interdict the IED network through the C-IED processes increased exponentially. Experience proved a hard taskmaster, and the ability of military engineers to locate and either destroy or exploit IED finds increased exponentially over the years. Of critical importance in the C-IED fight was the conceptualization that, to be effective, one needed to "defeat the network,"[44] that is to say, the IED network of manufacturers, distributers and emplacers and its leadership. That was done through a variety of means and by using all types of intelligence to focus C-IED operations. Also, it was noted that, over time, the greatest degree of accurate information regarding general explosive threats, IEDs, and caches, came from the local population, providing an indication of waning insurgent support and increasing Afghan and alliance security force gains.

C-IED analysis contributed to the development of tools in order to define IED activity and conduct both collection and targeting. That, in turn, assisted with determining the IED supplying, manufacturing, caching and training that was likely to be conducted prior to the device emplacement, resultantly permitting disruption of the system before device emplacement. Instrumental to that approach was cooperation across a host of staff sections and units. Maintenance of IED databases helped with the approach by

42. The KPRT detachment eventually moved to KAF. Telephone interview with Colonel Jennie Carignan, 14 November 2014. [Notes in possession of author]

43. Enclosure to Canada, Department of National Defence, Task Force Kandahar, "3350-1 (ALLO) Topic Lesson Report (TLR) – 10-061 Military Engineer Support to Operations (Draft)," n.d., 9; and telephone interview with Colonel Jennie Carignan, 14 November 2014. [Notes in possession of author]

44. For an overview of Canadian activities with regards to C-IED during this period, see Colonel Mike M. Minor, "Counter-IED: A pervasive, global threat still remains," *Vanguard* (October/November 2014): 31.

allowing for predictions to be made based on historical data. Combining accurate records keeping with the addition of current information was of invaluable help in determining IED networks. However, again, maintenance of those records and transmission of information across rotations appeared to be problematic.

The physical organization of the C-IED effort developed over time, but in broad terms it consisted of a grouping that included a commander, a headquarters element, analysis and collation capabilities, along with a number of small C-IED teams. These C-IED teams had improvised explosive device disposal (IEDD) operators, an electronic countermeasures (ECM) operator, a driver, and a tactical exploiter. Having at least two IEDD operators per team proved to be sufficient to sustain the operational tempo along with providing a sounding board during IEDD response planning. Moreover, this organization allowed each C-IED team to move in a single vehicle. Each team had at least one individual qualified in advanced surface explosive ordnance disposal and one qualified in tactical combat casualty care (TCCC), known as T-triple C. The challenge of using this high value but limited resource formation was in simultaneously supporting normal operations over dispersed locations while having sufficient resources to respond to incidents that would also take place across the area of operations.[45]

Mobility and Counter-Mobility

In addition to providing mobility support through C-IED, the cross spectrum of engineer mobility tasks including those directly associated with combat operations, like breaching through road and bridge construction, were exercised. While the armoured engineer vehicle (AEV) did not appear until the second combat rotation, it was greatly appreciated when it did arrive and was heavily used by successive rotations. During May 2007, while employed on Operation HOOVER in Zhari, the AEV conducted a complex obstacle breach, ploughing to breach a lane against IEDs and dropping fascine to cross a large wadi, which was in effect an anti-tank ditch, as part of a combined arms operation.[46] These AEVs proved to be the only vehicle in the engineer inventory that was capable of accomplishing a multitude of engineer tasks and replaced unarmoured, or improvised armoured, heavy equipment for those tasks. Regrettably, the notion that it needed to be linked to the deployment of armour—tanks—had precluded the deployment of the AEV prior to late 2006. That thought also seems to have been applied to the much needed Leopard I Medium mine ploughs and rollers, although they had been deployed to the former Yugoslavia without supporting tanks.[47] The AEV proved so multifunctional that one could see few deployments without this capability in the future.[48]

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45. Information on the developing C-IED effort redacted from "Appendix 4 Counter-Improvised Explosive Device," Canada, National Defence, Task Force Kandahar, "3350-1 OP Athena (COP) HQ 5-09 End Tour Report for Deployment to Afghanistan from February to November 2009," dated November 2009.

46. Lieutenant-Colonel Jake Galuga (January to August 2007 / Task Force 1-07).

47. For a discussion of the introduction of the first Leopards, see Major Rich Busbridge, "Minefield Extraction," in *Clearing the Way: Combat Engineers in Kandahar – 23 Field Squadron*, Major Mark Gasparotto, ed. (London, Ontario: Ardith Publishing, 2010), 218–225.

48. Despite that, it is a relatively old vehicle and needs to be replaced with a similarly capable vehicle at some point in the future. There is an AEV 2 replacement program underway with delivery currently projected around 2017. E-mail from Lieutenant-Colonel Mark Gasparotto to Howard G. Coombs, dated Wednesday, 5 November 2014, 10:29 AM, n.p. [In possession of author]

Furthermore, new methods of tactical mobility were developed to assist with battle group mobility, such as using all functioning AEVs in any mechanized operation through terrain, normally off road, that was unfamiliar or known to have a high explosive threat. The AEVs, along with any plough-equipped tanks, would literally scrape at least 10 centimetres of ground away as the convoy progressed in order to destroy or disrupt any IEDs en route.[49] Simultaneously, older methods of deliberate route-opening during battle group tactical activities were refined. EROCs, tank plows and rollers, in conjunction with engineer troops, were used to spearhead the advance. All canalizing ground was cleared with mine detectors in advance of the clearance suite. These activities were painstakingly deliberate, requiring a high degree of planning and organization. Prior to the operation, the history of the routes to be used, along with real-time intelligence and information, was analyzed, accompanied by any physical reconnaissance that could be completed. From that material, the geomatics section produced detailed maps. While the operation was ongoing, the troop commander was situated in the lead Buffalo of the EROC. During critical periods of the operation, the troop warrant officer dismounted to directly manage the sappers and attachments. The tactics, techniques and procedures for those breaching and clearance activities built on those that had been practised during the Cold War.

Road construction was one area where training was lacking, particularly with regards to the design and construction of asphalt roads, contracting, materials management, etc. An instance where that was an issue was in 2010, within a week of the relief-in-place with 23 Field Squadron, when 52e Escadron du Génie started construction of an 18-kilometre road into western Panjwaii, the area known as the "Horn of Panjwaii." Almost half of the squadron resources were committed to command and control, breaching and clearing operations, and the construction of the road. It soon became obvious that the squadron had limited knowledge of road construction techniques. That lack of knowledge contributed to last-minute changes to the road design and delivery schedule for materials and systemically indicated a need for specific training at the senior non-commissioned officer and junior officer levels.[50] Also, road construction came to be treated as a deliberate combat operation in contended areas with the equivalent of a combined arms combat team spearheading the engineer-led construction efforts.[51]

Combat Damage Remediation

A related focus that was unavoidable and consumed a fair amount of military engineer time and resources work was road remediation. That involved repairing the damage from use or combat operations. Remediation also highlighted the need for early training in road construction when a slight miscalculation or omission in planning could ruin a drainage system, turning a route used by NATO into a river. When something like this took place, it understandably caused more than a small

49. Major Nathan Packer (January to September 2008 / Task Force 1-08).

50. Major Nathan Packer (January to September 2008 / Task Force1-08) and Major François Sauvé (November 2010 to July 2011 / Task Force 3-10).

51. See Matthew Fisher, "Route Hyena a Canadian-built 'dagger through the heart of the Taliban'," *Canada.Com* (April 8, 2011), available at http://www2.canada.com/story.html?id=4584232; Internet, accessed 30 October 2014, n.p.

degree of anger amongst the local populace. Coupled with the environmental impact created by these roads and military activities, there was a constant need for remediation.[52]

Bridging

Related to mobility, bridging and fording efforts also took a great deal of effort at times. When one thinks of Afghanistan, all that often comes to mind is desert and dust, unsurprisingly, until confronted with the reality: river beds that are normally dry or shallow can become raging torrents at a moments' notice during the periodic rainy season. As bridging assets never were sent to theatre, immediate stopgap measures such as non-standard bridges (NSB) and ford sites became necessary. Additionally, improvised bridging was utilized to help alleviate the IED threat at crossing sites until the deployment of the AEVs.

The need for NSB manifested itself on a regular basis. During fall 2007 when the Arghandab River flooded to its high water line, fording from battle group elements of Forward Operating Base Masum Ghar to a key route, Summit, became impossible and the restoration of this important north-south link was critical. As a result of the NSB, construction for this location was beyond the capability of an engineer sub-unit and, thusly, 53 Field Squadron and the ESU worked closely together, using contact, or "reach back," with Canada to design a causeway made of locally poured concrete segments that rested on the river bed but allowed water to flow through and would support the Leopard II heavy tank, which was arriving in theatre at that time.[53]

The circumstances surrounding the completion of the Arghandab Causeway in December 2007, and its opening for both military and civilian traffic, prompted a certain degree of introspection regarding the engineer efforts. Its construction demonstrated that using a minimal amount of military engineers and maximizing civilian contractors and labour-intensive construction methods to employ unskilled local nationals was a successful combination. The primary effects achieved through this course of action were a reduced insurgent recruitment pool, a stimulated local economy, and increased security force mobility. The success of this project in achieving those three main effects was a significant factor in the evolution of the CMO in early 2008.[54]

The CMO was a structure with engineers in key leadership and technical positions augmented, with other arms filling generic positions, such as driver, radio operator, and force protection positions. It obtained services from local contractors and businesses, but most importantly it employed a large quantity of local males as unskilled labour in labour-intensive construction projects, like the Arghandab Causeway, and consequently generated wide support from local communities. It was a valued enabler in the counterinsurgency fight over the years that followed.[55]

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52. See the section on the "Rains of November" within Major Mark Gasparotto's chapter "Route Summit and the FOBs" in *Clearing the Way: Combat Engineers in Kandahar – 23 Field Squadron*, Major Mark Gasparotto, ed. (London, Ontario: Ardith Publishing, 2010), 113–115.

53. Lieutenant-Colonel Walter Taylor (July 2007 to March 2008 / Task Force 3-07).

54. Colonel Jacques O'Keefe (Joint Task Force Afghanistan Rotation 4).

55. Colonel Jacques O'Keefe (Joint Task Force Afghanistan Rotation 4); and, Colonel Alan Mulawyshyn (Joint Task Force Afghanistan Rotation 5).

In addition to facilitating movement and manoeuvre, counter-mobility techniques were also utilized by all sides of the struggle and saw a mix of both traditional and non-traditional employment. The insurgents employed IEDs not only as point obstacles covered by observation and fire, but also frequently employed IEDs in a manner where they were used creatively, and not necessarily with a human operator, in order to produce the most destruction to Afghan and NATO forces.

Tactical Infrastructure

Friendly emplacement of obstacles in an effort to shape the enemy was not uncommon. By 2009, obstacle belts in Kandahar were used in the same fashion as obstacle belts in conventional operations in order to link together natural obstacles with man-made barriers and tactical infrastructure (TI) to shape insurgent movement. Along with mobility and counter-mobility support, the construction of TI was an important force protection role of the engineers. This TI normally consisted, at minimum, of the living accommodations, bunkers, protective walls and life-support functions for forward operating bases (FOBs),[56] strong points (SPs) or combat outposts (COPs),[57] police sub-stations (PSS)[58] and other infrastructure, like access control points (ACPs)[59] for traffic control. Those were all constructed using a variety of readily available materials found locally or ordered and delivered. The field squadrons largely improvised the design of those structures until the ESU provided personnel for design support or, in some cases, validation. The functionality of those structures was a testament to the ingenuity of the engineers. By taking advantage of the reach-back capabilities for designs using 1 ESU, Defence Research and Development Canada (DRDC) Suffield, the SET and the contracting officers of the KPRT were instrumental in ensuring that the structures constructed provided genuine survivability enhancements for their Afghan, Canadian and other field partner occupants.

By the time 52e Escadron du Génie deployed in 2010, 23 Field Squadron had implemented the TFK barrier plan. The intent of the plan was to emplace obstacles, supported by ACPs and observation, which would serve to move the population into areas where they could be searched and controlled. This was meant to physically separate insurgents from the local population, as mandated within counterinsurgency doctrine. As part of that effort, it was identified that ensuring that the local civilian population was aware of the purpose of those obstacle belts through a coordinated information operations plan and providing observable gaps for them to utilize went a long way to mitigating any possible irritation to normally supportive Afghans.[60]

Along with TI construction, the necessity of a centralized engineer park to hold

56. A FOB is a secure forward location used for mounting military operations. It normally contains all combat and support elements, in addition to the supplies required for extended operations.

57. An SP or COP normally contains a detachment of troops stationed some distance away from their main body for the purpose of conducting military activities in a specific area.

58. In a similar fashion to an ACP, a PSS provides the equivalent of a local police station with significant force protection capabilities.

59. An ACP provides the force protection necessary for an assigned detachment of security personnel conducting vehicle and other searches along designated routes.

60. Major Jim Smith (April to October 2010 / Task Force 1-10); and Major François Sauvé (November 2010 to July 2011 / Task Force 3-10).

Source: Combat Camera AR2007-4071-0199

A Zettlemeir front-end loader backs out of a construction zone at Forward Operating Base MaiSum Ghar, where field engineers are improving defences.

engineer specific stores and material quickly became apparent. Without the ability to keep a significant amount of engineer resources, material, stores and scaling available, the capacity of combat engineers to provide timely assistance was significantly reduced as construction material had to be flown in from Canada or purchased and transported through Pakistan. With the leasing of Russian Ilyushin IL-76 strategic lift, and their subsequent replacement by the purchase of American C-17 Globemasters, stores and material could be brought to KAF in sufficient quantities to enable the establishment of such an engineer park. DCC also facilitated the greater availability of local materials through its contracting branch. Resultantly, the supported forces in southern Afghanistan no longer needed to wait a significant amount of time for the common defensive and construction stores required for force protection.[61]

Construction Engineering

As part of this larger effort to build and maintain infrastructure of all types, the Engineer Support Unit (ESU) at KAF with detachments at CNS, as well as the Engineer Support Flight (ESF) at the Intermediate Support Base, Camp Mirage, provided construction engineer support to all Canadian units in Afghanistan, which were grouped as Joint Task Force – Afghanistan (JTF-A). In turn, CANCAP employees and DCC personnel at KAF and CNS supported the ESU and its detachments. The ESU operated, maintained and repaired existing infrastructure, renovated existing

61. Major Paul Hurley (Joint Task Force Afghanistan Rotation 3); and Colonel Jacques O'Keefe (Joint Task Force Afghanistan Rotation 4); and, as a result of the sheer volume of infrastructure that was eventually created, it taxed the resources of theatre engineers to maintain existent TI and construct new TI, which necessitated efforts to periodically rationalize TI holdings within the framework of tactical operations.

infrastructure as required and constructed new facilities. These projects were carried out at either secure, established camps or at relatively austere FOBs in a higher risk environment. They maintained their planned focus of supporting Canadian troops outside of KAF. In order to do so, the ESU leadership pursued alternate means of accomplishing work at KAF, by embedding CANCAP employees within the shops, hiring locals, deploying tactical assistance visits (TAV) and relying heavily on local and international contractors. The integration of DCC and CANCAP with the ESU proved to be a tremendous success with a multi-million dollar construction and maintenance program implemented under very challenging conditions.[62]

During the 2006–2008 period, it became quickly evident that the integrated structure, imposed as part of the early rotations, combined with the sheer amount of engineer work that needed to be accomplished, did not work as well as it might have if an encompassing doctrinal command and control construct had been implemented. Instead of engineers being centralized to maximize the ability to deal with engineer-specific tasks, they were habitually divided in a decentralized fashion to support various components of the battle group, even occasionally attaching a couple of sappers to an infantry section. This dissipated the critical combat power that engineers brought to the fight. Centralization of engineer assets to conduct larger, squadronlevel engineering tasks was at times met with resistance from manoeuvre commanders, as it would take away the intimate combat engineer support that they valued dearly, particularly that related to ETHAR. The continuous use of engineers often led to fatigued soldiers, whose effectiveness was degraded as a result. Plus, in the early rotations, centralization of those packets of engineers for larger scale engineer tasks was not achievable because of distances and/or insurgent activity. For example, during Operation MEDUSA, Forward Operating Base Masum Ghar and CNS were separated by the enemy and sappers were forced by those circumstances to clear towards each other during the battle. Instances such as that further stretched engineer resources and limited a commander's options as a result of the ever present need to maintain both mobility and force protection during tactical activities. Even the relatively innocuous and seemingly rational decision to affiliate field troops with sub-units created challenges, as there were insufficient field troops to affiliate and still conduct centrally directed, higher priority tasks. Sub-unit commanders envisioned affiliated field troops as "their" engineers and understandably wished to access the same sappers during successive combat operations.[63]

Command and Control – Centralization versus Decentralization

This tension between centralization and decentralization of military engineers is not new—there are never enough engineers—and this dilemma has been previously recognized:

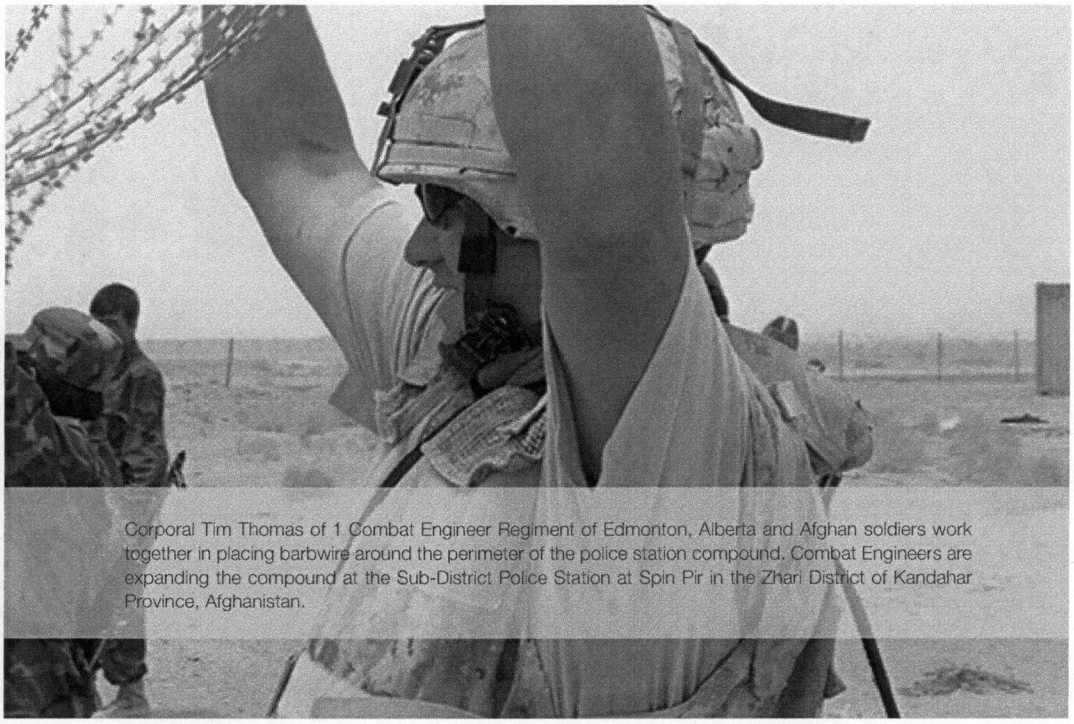
62. Major Paul Hurley (Joint Task Force Afghanistan Rotation 3); and Colonel Jacques O'Keefe (Joint Task Force Afghanistan Rotation 4); and, Colonel Alan Mulawyshyn (Joint Task Force Afghanistan Rotation 5).

63. Major Jim Smith (April to October 2010 / Task Force 1-10).

> With widely separated tasks, the squadron commander is faced with a difficult problem of command and control. There is a limit to which he can safely decentralize command and control without impairing the efficiency of his unit or jeopardizing his capability to provide a concentration of effort. As the problem has so many variables based on the type of operation, no one solution can be offered…It must be appreciated that the effectiveness of engineer support is limited by the available resources. These resources can only be distributed to a certain point, beyond which their effectiveness to perform any given task is impaired.[64]
>
> *—CANADIAN ARMY MANUAL OF TRAINING: THE FIELD SQUADRON IN THE INFANTRY BRIGADE GROUP (1960)*

In retrospect, there are several factors that contextualized the various methods of employing engineers. In several instances, battle groups and their sub-units elected to employ and retain engineers close at hand for force protection and ensure that there was familiarity with their area of operations. Another consideration, connected with the continuous shifting of Canadian military forces across the districts and provinces of southern Afghanistan from 2006 until the surge of 2009, was the evolution and adoption of counterinsurgency doctrine. There were growing demands with each movement of forces for engineers to support the doctrinal stages of the counterinsurgency battle—CLEAR, HOLD and BUILD. When manoeuvre elements commenced the

64. Canada, Department of National Defence, Canadian Army, *Canadian Army Manual of Training: The Field Squadron in the Infantry Brigade Group* (Ottawa: Army Headquarters, 1960), 6.



Corporal Tim Thomas of 1 Combat Engineer Regiment of Edmonton, Alberta and Afghan soldiers work together in placing barbwire around the perimeter of the police station compound. Combat Engineers are expanding the compound at the Sub-District Police Station at Spin Pir in the Zhari District of Kandahar Province, Afghanistan.

CLEAR phase, engineers provided close support to help win the fight. With the previously outlined absence of infantry pioneers on the battlefield, the engineers executed those former pioneer skills. Others may in some instances have conducted these tasks to free up sappers for combat-engineer-specific tasks and missions. In the HOLD and BUILD stages, friction was created as a result of the need to pull back those engineers, regroup and centralize in order to conduct larger-scale engineer tasks. Accordingly, it was observed that decentralized execution did not mean that engineers should be attached to sub-units under command, like OPCOM, or direct control, such as OPCON,[65] but employed in a decentralized fashion while under centralized engineer control. A relationship that allows the assignment of tasks for specific operations but not the ability to sub-divide, reallocate or directly shape the conduct of technical operations, for example TACOM,[66] may, in retrospect, normally be the most appropriate command relationship to ensure the effective use of engineers. However, in the absence of an appropriate command and control relationship, engineers were often divided up

65. "Operational command (OPCOM) is defined as the authority granted to a commander to assign missions or tasks to subordinate commanders, to deploy units, to reallocate forces, and to retain or delegate operational and/or tactical control as the commander deems necessary. It does not include responsibility for administration."; and "Operational control (OPCON) is defined as the authority delegated to a commander to direct forces allocated so that the commander may accomplish specific missions or tasks that are usually limited by function, time, or location; to deploy units concerned; and to retain or assign tactical control of those units. It does not include authority to assign separate employment of components of the units concerned. Neither does it, of itself, include administrative or logistic control." Canada, Department of National Defence, *Canadian Forces*, B-GJ-005-300/FP-001, *Canadian Forces Joint Publication CFJP 3.0 Operations* (2011-09), 3-2.

66. "Tactical command (TACOM) is defined as the authority delegated to a commander to assign tasks to allocated forces for the accomplishment of the mission assigned by higher authority." Canada, Department of National Defence, *Canadian Forces*, B-GJ-005-300/FP-001, *Canadian Forces Joint Publication CFJP 3.0 Operations* (2011-09), 3-2.

and assigned to the lowest tactical levels. This diffusion of engineer resources and skills lessened their ability to achieve all but relatively low-level tasks and reduced the Engineer Squadron Commander to a "dispatcher of troops."[67]

Also, there had been some concern prior to 2009 that conduct of centralized squadron-level engineer operations would leave the battle group with insufficient close support. That was not the case, as the field sections that were left with each combat team were able to provide sufficient support to framework operations, and a more robust capability could be surged back into a close support role for specific operations. At the same time, the presence of the squadron commander to physically command engineer operations once more than a single field troop was involved, proved imperative. Along with centralized engineer operations, the attachment of manoeuvre platoons or troops to provide security and allow engineers to be focused on their specialized tasks during those operations was invaluable and reinforced the continuing necessity to train in a combined arms environment.[68]

Specialized Engineering Advice and Capability

As part of general and specialized operations, the provision of military engineer advice within the all-arms context was critical to effective use of combat and other engineers. That assistance was necessary to make employing units aware of military engineer capabilities and limitations. It was evident that the relationships forged in routine combined arms training greatly facilitated understanding, as did integrated pre-deployment training. Accordingly, the requirement for military engineers to be integrated extensively into collective training during war and peace was reinforced by the combat operations in southern Afghanistan. Furthermore, the need to better train junior military engineers of all ranks in the provision of engineer advice, as well as to match engineers, their qualifications and experience to appropriate deployment positions, was apparent over the course of the war. This issue was intensified as the years in Afghanistan took a heavy toll on the daily operations, training and development of military engineers. Whereas normally an engineer would have time in a unit to learn and develop after career courses before going on another mission, the high operational tempo, and in some cases multiple deployments with little lag between them, precluded against this reaffirmation or development of sapper skills. The depth of specialist knowledge dwindled considerably while focus was placed on the preparation of military engineers for upcoming Afghanistan rotations. Through it all, there were additional skills, particularly relating to C-IED, that were deemed important enough to add to training. As a result, military engineers became more narrowly focused on the imperatives of the Afghan mission. This lack of professional breadth was particularly apparent when applied to non-standard military engineer tasks, such as road construction, or tasks not normally associated with the mission.

Pre-deployment training did not necessarily meet this deficit. The training prior to each rotation was generally based on past events from Afghanistan, with attempts

67. Major François Sauvé (November 2010 to July 2011 / Task Force 3-10); the quote is taken from a telephone interview with Colonel Jennie Carignan, 14 November 2014. [Notes in possession of author]

68. Lieutenant-Colonel Walter Taylor (July 2007 to March 2008 / Task Force 3-07); and a telephone interview with Colonel Jennie Carignan, 14 November 2014. [Notes in possession of author]

to keep it up to date by using ongoing theatre situation reports. It was not designed to address the breadth of engineer skills, but rather it focused on preparing for the mission that was. However, it did provide positive training outcomes by using the experience of those who had recently deployed to assist with the training. Exceptions to that were initial deployments where the training was based on estimates and intelligence reports rather than on the personal or professional experiences of previously deployed Canadians. In any case, despite best efforts to prepare for any mission, there is always a need to assimilate changes between past deployments, training and actual operational employment in a continuous process of professional adaptation.

Engineer Support Coordination Centre

On a somewhat related note, invaluable to the provision of engineer input into planning processes, particularly in the later years of the mission at the TFK level, was the ESCC, which encompassed the engineer staff functions within current operations and future plans. Prior to 2009, an ESCC was part of the battle group Tactical Operations Centre (TOC). During that time, depending on the pre-deployment training and integration with the supported formation headquarters, the effectiveness of engineer planning at the TFK level was not optimal and engineer input into TFK-generated operations and planning was often too late to substantially inform the courses of action being considered. Accordingly, that inefficiency diminished the ability of the military engineers to support TFK-generated actions. That situation lasted until November 2009 when an ESCC was officially integrated at brigade level, in accordance with normal engineer practice, into the TFK headquarters, within the TOC. That permitted well-timed incorporation of engineer advice and staffing into current operations and future plans. The enhanced effectiveness was produced by placing a military engineer operations warrant officer and a signaller within the TFK TOC to quickly react to engineer requests or issues as well as monitor an engineer communications net created at the same time for command and control of operations. Also, co-located with the TFK planning section was a military engineer plans officer, normally a staff-qualified captain, who provided the engineer contribution into TFK plans, directives, instructions, and orders based on TFK intent and the TFK Engineer Regiment concept of operations to support that intent. Resultantly, the placing of the ESCC within the TFK TOC from 2009 onwards was not only in line with engineer procedure but also greatly increased engineer efficacy and the associated engineer-generated effects in the TFK area of operations.[69]

During the repositioning of Canadian elements during 2009–2010, conditions were created that permitted the conduct of stabilization operations within the counterinsurgency construct. Operations KALAY 1 and 2 took place. They were focused on Deh-e-Bagh, in Dand, and the surrounding region. The mission statement for Operation KALAY 1 encapsulates the ideas advocated by the TFK Commander, Brigadier-General Jonathan Vance:

> TFK, in partnership with GIRoA and ANSF, will stabilize DEH-E-BAGH (DeB) by focusing the SHAPE, CLEAR, HOLD, BUILD approach directly upon the

69. See note 26; and, e-mail from Colonel Jennie Carignan to Howard G. Coombs dated Saturday, 15 November 2014, 2:37 PM, n.p. [In possession of author]

> population IOT [in order to] improve DAND District's security; so as to facilitate the COIN [counterinsurgency] effect through Governance, Reconstruction and Development (GRD), and Security Sector Reform (SSR) improvements in the District and set the conditions for similar expansion within the populated approaches to KANDAHAR City (KC).[70]

Subsequently, engineers enabled combat and stability operations during those two successive operations. Field engineers provided direct support to military operations throughout, while the CMO, working with the field partners in the KPRT, provided engineer support more so in the HOLD and BUILD phases. During KALAY 1 the CMO, together with the KPRT, focussed on Deh-e-Bagh through the SHAPE, CLEAR, HOLD, and BUILD approach. Large numbers of local workers were hired through employment programs and provided with construction materials to facilitate reconstruction and development within the district, particularly in the vicinity of Deh-e-Bagh, and to create conditions for the expansion of stabilization effects along the populated approaches to Kandahar City. In effect, the CMO played a large part in those actions by assisting with a gradual enlargement of positive counterinsurgency effects, through (1) managing and administering projects that used labour intensive approaches, (2) enabling projects through local contractors, (3) mentoring allies on how to execute their own projects, and (4) facilitating the transfer of CMO-based plans to those overseen by the Canadian whole-of-government team and GIRoA.[71]

Following on from that, KALAY 2 focused on solidifying the gains created and enlarging them further. By the summer of 2010, one could discern a significant drop in insurgent activities from Kandahar City through Dand to the district boundary with Panjwaii. The last combat rotation took advantage of those gains to continue the expansion of stabilization into Panjwaii during fall 2010 to summer 2011, when the area transitioned to American control. In retrospect, the period starting with KALAY 1 marks the beginning of textbook Canadian counterinsurgency operations and needs more study.

Thus, the circumstances created by the surge and smaller area of responsibility, as well as the need for integrated, whole-of-government counter-insurgency operations, as demonstrated in both Operations KALAY 1 and 2, allowed the return to centralized command and control of combat engineers, first at the section level, then at the troop level; finally, the battle group field squadron was centralized to conduct squadron-level operations.[72] Those operations were increasingly directed towards fulfilling the imperatives of integrated whole-of-government activities. Moreover, the growing importance of specialized general support engineer organizations created the opportunity for realignment at the TFK level. The ESU, with the ability to execute multi-disciplinary construction tasks and employ contractor elements to support FOB

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70. Redacted from Canada, Department of National Defence, Task Force Kandahar, "TFK OP KALAY I (VILLAGE I)" May 2009, 1; and, ideas of the successive phases of counterinsurgency evolved as the mission continued and became more nuanced from the original CLEAR, HOLD, and BUILD construct.

71. Canada, Department of National Defence, Land Force Central Area, "Theatre Lessons Learned Report (TLR) 09/034 Engineers Support to Stability Operations (COIN) Joint Task Force Afghanistan TFK 5-09 Afghanistan 2009," November 2009, 2-4.

72. Major Jim Smith (April to October 2010 / Task Force 1-10).

infrastructure, the CMO, which provided coordination of local civilians to conduct engineering tasks, and the SET, who provided assistance and oversight to construction tasks, took on greater importance in the multidimensional battle being waged across an increasing smaller battlespace. On top of those organizations and in direct support of the military commitment were the theatre support engineers (TSE), a strong construction engineer section that was located at the intermediate staging base, Camp Mirage, and provided infrastructure support and minor construction abilities. They also served as a source of construction engineers who could be deployed forward to augment or support the other Canadian engineer elements.[73]

Accordingly, during 2009–2010, 5e Régiment du genie de combat provided the regimental headquarters for all TFK engineers, who were then combined in a process that amalgamated under one commanding officer the various lines of engineer support—specialist advice and close and general engineer support. By the end of the combat mission in 2011, a regimental structure that combined all of those aspects was firmly in place, with functioning operational- and tactical-level engineer support.

Command and Control – The Engineer Regiment

By 2011, the structure of the TFK Engineer Regiment was the result of all that had taken place over the previous years.[74] The commanding officer was, in effect, commanding a combined combat engineer regiment and an engineer support regiment. Furthermore, as the senior engineer within the theatre of operations, the commanding officer coordinated and controlled the use of all engineer assets within the Joint Task Force—all Canadian military elements in Afghanistan and the intermediate staging base. Along with that went the normal duty of the provision of engineer advice to the Commander TFK, who was also responsible for JTF-A. Necessary to enable planning and operations was a regimental headquarters (RHQ). As part of that function, the RHQ included the ESCC located in the TFK TOC.

The field squadron continued to provide engineer close support. While the squadron was OPCOM to the battle group, the CO TFK Engineer Regiment exercised technical control, thus ameliorating most issues previously described. The field squadron maintained an ESCC, co-located with the battle group TOC, three troops and an EROC. Two of the troops were field troops and consisted of three sections apiece, while the third troop was a composite troop of three field sections, a heavy equipment section and armoured engineering vehicles (AEVs). Notably absent, because of manning restrictions, was an engineer reconnaissance detachment. This perennial lack of engineers in contrast to the tasks specified was occasionally exacerbated by the depletion of the 10 per cent reinforcement pool as a result of the need to replace personnel in theatre.

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73. Canada, Department of National Defence, Operational Support Engineer Group, "4500-1(OS Engr 5) General Engineer Support Force Preparation Instruction – JTF Afghanistan," 16 June 2009, 1–2.

74. The final organization of the Task Force Kandahar Engineer Regiment comes from the enclosure Canada, Department of National Defence, Task Force Kandahar, "3350-1 (ALLO) Topic Lesson Report (TLR) – 10-061 Military Engineer Support to Operations (Draft)," n.d. The document was drafted for Brigadier-General Dean Milner, Commander Task Force Kandahar, at the end of the deployment to southern Afghanistan sometime prior to July 2011.

The Engineer Support Squadron (ESS) was also created. The ESS was a theatre-specific designation that was different from an engineer regiment support squadron. Before the organization of the Engineer Regiment, the ESS had been known as the Engineer Support Unit (ESU). The ESS provided not just TFK, but all Canadians of JTF-A, a combination of general- and close-support-level military engineer capabilities. That included the provision and maintenance of infrastructure, in addition to delivery of limited specialist engineer support (fire protection services, environmental engineering, and contracting). Furthermore, the ESS gave engineer assistance to forward operating bases in the form of infrastructure construction and utilities. It also contained military and civilian contracting abilities, including CANCAP and DCC representatives. In effect, the ESS was the "contracting engine" for any engineer function that supported the JTF-A. Without this ability to contract equipment or resources, most engineer operations would have been unsuccessful.

In addition to the ESS, there was an Engineer Construction Squadron (ECS), which like the ESS was a theatre-specific designation and was not the same as the similarly named Engineer Regiment Construction Squadron. The ECS in southern Afghanistan was previously known as the Construction Management Organization (CMO), the role of which has previously been described herein. In JTF-A, the ECS had put civil–military engineering into effect through the execution of security and development-based reconstruction projects in an effort to assist stabilization to the area of operations. The ECS had a squadron headquarters, four engineer construction teams (ECTs), and the SET.

There was also an EOD squadron. It consisted of a squadron headquarters (SHQ), four C-IED teams and an Afghanistan National Army (ANA) EOD mentor team. This sub-unit had experts who were trained in defeating IEDs, including analyzing and exploiting IED incidents, and the development of tactics, techniques, and procedures (TTP) to counter the IED threat. It also worked with the intelligence personnel to "defeat" the IED network. Moreover, their work was not limited to IEDs but encompassed all aspects of the explosive ordnance threat.[75]

Last, but certainly not least, was the capacity-building provided by the TFK Engineer Regiment Engineer Advisor Team. This three-person team assisted with efforts to develop the ANSF by giving mentorship to the Afghan National Army (ANA) Engineer Company of the 4th Battalion (or Kandak), 1st Brigade, 205 (Hero) Corps. That type of security force assistance was invaluable in helping the ANA develop the capacity to conduct independent ground operations.

During that same period, it is difficult to overstate the contribution of the TFK Engineer Regiment to reconstruction and development. Of great value in enabling that work was the Commander's Contingency Fund (CCF), which financed a host of quick impact projects. The CCF was similar to the American Commander's Emergency Response Program (CERP). It permitted the commander of TFK to access and deliver reconstruction and development project funds in order to bridge the gap between existing projects funded by other donors and planned interagency program funding. Examples of CCF projects prior to 2010 included Afghan National Police infrastructure

75. Telephone interview with Colonel Jennie Carignan, 14 November 2014. [Notes in possession of author]

and equipment, Kandahar University Campus improvements, and equipping the Kandahar Fire Department. Linked to that was the Cash for Work program—comparable to the United States concept of "Money as a Weapon System." That made it possible to hire fighting-age men and youths to work on local projects during the times of year that insurgent violence was highest, normally at the end of the agricultural season of plantings and harvests. By employing fighting age males, TFK reduced the numbers available to insurgent commanders through employment. Nevertheless, it was always understood that such activities had to lead to sustainable governance and development. They needed to link closely into Department of Foreign Affairs and International Trade (DFAIT) and Canadian International Development Agency (CIDA) efforts and expertise. CMO and civil–military cooperation (CIMIC) efforts were invaluable in facilitating this part of the effort.[76]

Military Engineering in a Counterinsurgency

Resultantly, during Canadian operations over the last rotation, there was progress in both Dand and Panjwaii, with the latter being arguably the most contentious district in Kandahar throughout the war; it was known as the "home of the Taliban." The progress can be discerned by examining the changes in the two districts over the course of the last year of combat operations during 2010–2011.[77] Canadian military engineers supported stabilization operations in these districts by ensuring that freedom of movement was maintained in and around those districts through constant road improvements. The route construction enabled the movement of ANSF and NATO forces to conduct security activities as well as support governance and development initiatives—that ultimately assisted in reinforcing the legitimacy of the Afghan government and rejuvenating the local communities through access to health care, education and markets for their goods. The last Commander TFK, Brigadier-General Dean Milner, noted that such roads were "a dagger through the heart of the Taliban."[78] All in all, over 103 kilometres of roads were constructed or improved, 40 kilometres of which were paved, and four bridges were constructed. That was done through a combination of local contracting with CCF funding and with the resources of the TFK Engineer Regiment, which completed over 150 reconstruction/construction projects. Although relatively small, with only 261 military and civilian personnel (seven DCC and 74 CANCAP), the TFK Engineer Regiment influenced almost all aspects of the TFK effort. In addition to the work they completed and supervised, they also ensured the prioritization and synchronization of engineer, stability, and reconstruction efforts.[79]

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76. Canada, Government of Canada, House of Commons Committees – Standing Committee on National Defence (39-2), "Government Response to the First Report of the Standing Committee on National Defence – Canadian Forces in Afghanistan" (presented to the House on 17 October 2007); Internet, available at http://www.parl.gc.ca/HousePublications/Publication.aspx?DocId=3077584&Mode=1&Language=E, accessed 15 April 2013, n.p.; see United States, United States Army, Center for Army Lessons Learned, "Handbook No. 09-27 – Commander's Guide to Money as a Weapons System," (April 2009); Internet, available at http://usacac.army.mil/cac2/call/docs/09-27/09-27.pdf, accessed 15 April 2013.

77. Dr. Howard G. Coombs, "APLN.06.03.LE Introduction to the Comprehensive Approach to Operations in a Joint, Inter-Agency, Multinational and Public Environment," Presentation to the Army Operations Course, Canadian Army Command and Staff College, Kingston, ON (31 October 2011), slide 38.

78. Matthew Fisher, "Route Hyena a Canadian-built 'dagger through the heart of the Taliban'," *Canada.Com* (8 April 2011), available at http://www2.canada.com/story.html?id=4584232; Internet, accessed 30 October 2014, n.p.

79. Dr. Howard G. Coombs, "APLN.06.03.LE Introduction to the Comprehensive Approach to Operations in a Joint, Inter-Agency, Multinational and Public Environment," presentation to the Army Operations Course, Canadian Army Command and Staff College, Kingston, ON (31 October 2011), slide 38.

Sapper Allan Vartdy, 2 Combat Engineer Regiment (2CER), inserts a detonation cord into the beehive explosive.

Source: Combat Camera AR2010-0320-43

In a similar fashion, the TFK Engineer Regiment in partnership with CIMIC teams organized 521 projects directly supporting and involving Afghans in key villages and helped create 10,000 man-days of employment. These included:

Canals and drainage projects: 29 canals (56 kilometres); the majority of these were executed by the ECS;

Schools (in partnership with CIMIC): 28 schools;

Mosques (in partnership with CIMIC): 42 mosques;

Police infrastructure: 18 sites;

Governance infrastructure: seven sites;

Health clinic: one clinic.

The CMO, in conjunction with CIMIC teams, also facilitated smaller projects that assisted with the necessities of everyday life. That support included a wide range of activities, from humanitarian assistance to support for Afghan initiatives of all types. At the same time, the initiatives were connected to programs and policies facilitated by DFAIT and CIDA on behalf of the Afghan government.[80]

In addition to support for reconstruction, development and governance, combat operations continued with great effectiveness. By February/March 2011, 58 per cent of all cache finds in Regional Command (South) were in the TFK area. That meant 148 fully-constructed directed fragmentation charge IEDs, material to construct another 150 IEDs, seven suicide vests, and 31 anti-tank mines had been discovered. This was a collaborative effort that highlights the benefits of the TFK Engineer Regiment structure, the all-arms integration within TFK and the collaboration with intelligence agencies, all within the context of the changed tactical circumstances. The positive situation in the TFK battlespace was captured by the Commander ISAF, General David Petraeus, who, while assessing operations during summer 2011, noted "June saw fewer insurgent attacks than last June, and that's quite significant, and May was quite the same."[81] Consequently, one can review the results and opine that, despite extreme challenges along the way, Canadian military engineers—as part of a whole-of-government and allied force security team—had indeed "punched above their weight."

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80. Dr. Howard G. Coombs, "APLN.06.03.LE Introduction to the Comprehensive Approach to Operations in a Joint, Inter-Agency, Multinational and Public Environment," presentation to the Army Operations Course, Canadian Army Command and Staff College, Kingston, ON (31 October 2011), slide 41; and the discussion of the TFK Engineer Regiment in 2010–2011 taken from Howard G. Coombs, "Afghanistan 2010–2011: Counterinsurgency through Whole of Government," *Canadian Military Journal* 13, No. 3 (summer 2013): 22–23.

81. Dr. Howard G. Coombs, "APLN.06.03.LE Introduction to the Comprehensive Approach to Operations in a Joint, Inter-Agency, Multinational and Public Environment," presentation to the Army Operations Course, Canadian Army Command and Staff College, Kingston, ON (31 October 2011), slides 32 and 36. Quotation taken from slide 32.

Source: Combat Camera AR2011-0120-01

PART 4 – THE MOVE FROM KANDAHAR TO KABUL, 2011[82]

This examination of the efforts of Canadian military engineers in southern Afghanistan would not be complete without an attempt to explore the engineer consolidation at KAF by the TFK engineers and capture the principal themes of the Mission Transition Task Force (MTTF) Engineer Regiment. The latter was a small unit that had achieved incredible results. It gave engineer support to the MTTF and assisted Canada's transition to Kabul by closing out the last rotation of Operation ATHENA in Kandahar. One can argue that, like the efforts of Task Force Holdfast in 2005–2006, the impact of the work done by the MTTF Engineer Regiment was in the strategic rather than the tactical realm.

In order to set the conditions for the relief in place (RiP) with the incoming American forces of 1st Stryker Brigade Combat Team, 25 Infantry Division, in the spring of 2011 and the subsequent arrival of the MTTF, the TFK engineers conducted Operation IFTEKHARI SPAREL. The operation encompassed all engineer activities necessary for Canadian military consolidation at KAF by July 2011. That included recovery or divestment of engineer-related materiel and the final handover of infrastructure, both tactical and otherwise.

This meant that prior to completion of the RiP, all Canadian engineer capabilities were either brought back to KAF or divested to the incoming force. During the preparations for engineer consolidation, all non-mission essential engineer equipment and materiel was returned to KAF. By April 2011, an advance element of the MTTF had arrived in KAF to augment the Engineer Regiment and help with the centralization of engineer equipment and material. Overall, the inventory and recovery of engineer equipment and materiel went reasonably well, but several issues arose with the transfer of general engineer support and sustainment functions at the tactical infrastructure.

The responsibility for the TI was given to the United States military by mid-June 2011. During the course of the engineer handover, it became apparent that our nations differed with regards to concepts of engineer support. Rather than group engineers with the capabilities to conduct the work needed at smaller TI with tactical formations (brigades), theatre-level engineers were dispatched to deal with those tasks. At larger TI, considered to be those who held over 300 persons, engineer support was contracted to their Logistics Civil Augmentation Program (LOGCAP), which was similar to the Canadian program, CANCAP. However, it took time to determine all aspects of the support required and for those contracts to be put in place or for theatrelevel engineer arrangements to be made. Consequently, Canadian specialist engineers remained with the TI supporting all forces at that location until, in some cases, the very last Canadians had departed. Also, many Canadian real-life support contracts were left in place throughout the RiP until all Canadians had departed the TI. Important to note in the handover process of TI was the requirement

82. Unless otherwise indicated, much of this portion of this report is drawn from Canada, Department of National Defence, Headquarters Mission Transition Task Force, "3500-1 (JLLO) Topic Report 11-098 Engineer Consolidation," 20 September 2011; and Canada, Department of National Defence, Headquarters Mission Transition Task Force, "ANNEX C to 3500-1 (JLLO) Mission Transition Task Force Engineer Regiment (MTTF Engineer Regiment)," 7 December 2011.

to complete formal environmental baseline studies or at least provide a record of the state of the environment prior to giving up control of the TI.

Creating accurate inventories facilitated other aspects of engineer consolidation. For example, the Engineer Support Squadron (ESS) detachment commanders listed engineer resources at each location. Those lists were divided into that which was to be returned to KAF and that which was to be transferred to incoming American forces. In order to accomplish this painstaking work, ESS detachment commanders worked in tandem with NSE detachments to accurately track items such as force protection barriers, air conditioners (AC), panels, wells, ballistic International Standards Organization (ISO) containers,[83] concrete pads, standard ISO containers, sea containers, reefers, and firefighting equipment. Construction material was not counted. Bulk and not opened construction materiel was transferred, as were consumable types of welding spares, packaged POL, etc. No construction material was returned to KAF. Additionally, defensive stores at the TI were all considered consumed and not returned to KAF. As much as possible, tools and equipment were sent back to KAF throughout the duration of the last combat rotation. By the end of the last Canadian rotation, there were only one or two sea containers of tools remaining in the forward locations.

It was noteworthy that, while most relocatable temporary camp (RTC) material was to be returned to Canada, that necessitated creating solutions that would provide reasonable levels of support to the incoming American personnel. Mobile Expandable Container Configuration (MECC) ablution units were replaced with sea containers that were locally converted to ablution units. Additionally, prior to withdrawing the RTC material from the TI, all the RTC electrical distribution systems had to be replaced with commercial equipment. The electrical distribution demanded a significant amount of work, particularly with regards to creating bills of material and carrying out the tasks. Furthermore, while many of the ISOs were initially to be grouped at KAF and brought back to Canada, authority was later received to sell the items, and all of the ISOs that had not yet been consolidated to KAF were transferred from Canadian control.

The accounting of items on the Engineer Controlled Equipment List (ECEL) proved challenging. This equipment, along with RTC, had been spread across the TFK area of operations since the commencement of the mission in southern Afghanistan. Plus, little or no records detailing the equipment or materials had been maintained. Over the last two rotations, the ESS had attempted to create accurate inventory lists, which were then used during the RiP to aid in the withdrawal of engineer material to KAF. However, the supply customer account (SCA) for this RTC material had, since February 2008, been held by CANCAP in order to provide continuity of the SCA for RTC. Unfortunately, that created the anomalous situation of the SCA holder having to rely on a proxy—military engineers—to verify the accounts. From this it was realized that better accounting and tracking of RTC as well as ECEL assets was necessary and, moreover, not just at the end of the mission but throughout its duration.

83. ISO containers are generically durable and reusable freight containers that are of rectangular shape and normally of a size that can be put on the bed of a transport. They are normally tall enough to accommodate a standing person. Many specialized versions have been developed over time, including living containers and containers offering ballistic protection to its contents.

Mission Closeout

Following the cessation of TFK engineer activities in July 2011, the MTTF Engineer Regiment carried on with the activities that were necessary to support the closing of the Canadian mission in Kandahar. The MTTF Engineer Regiment was made up of a regimental headquarters, 11 Field Squadron, 14 Support Squadron and 8 Troop. Notably, while the headquarters provided all normal command and control functions and could deal with independent operations, it was not staffed for continuous 24/7 operations. But given the nature of the MTTF employment, that was an acceptable construct. 11 Field Squadron had field and support troops, along with heavy equipment and armoured engineer sections. It also had an explosive ordnance disposal team, a robust quartermaster section and the squadron headquarters. The Engineer Support Squadron and 14 Support Squadron had a headquarters with an environmental officer, a construction troop, the MTTF fire marshall, a contracts cell, a Defence Construction Canada detachment and CANCAP representatives. Finally, 8 Troop provided for combat service support through a small command element by way of a logistics office and the regimental quartermaster, along with maintenance, supply and transport sections.

The tasks of the MTTF Engineer Regiment were accomplished within the vicinity of KAF. The conditions set by the TFK consolidation of engineer equipment and material allowed this relatively small organization to effectively provide engineer support to the transition mission. Even using a reduced doctrinal organization still allowed for the full range of engineer capabilities and provided a degree of employment flexibility that would not have otherwise been achieved. The integral combat service support elements provided critical functions during those last months. They permitted correct accounting for years of accumulated engineer stores and equipment, as well as provided connectivity to the Mission Closure Unit for equipment return and the Material Divestment Unit for the divestment of designated material. Besides the tracking, return or disposal of equipment and material, environmental remediation, destruction of ammunition that could not be returned to Canada, closure of engineer project files, and importantly, disassembly and repatriation of the Kandahar Memorial to the fallen fell within the purview of the MTTF Engineer Regiment.

In a similar fashion to the handover of TI during the TFK RiP, infrastructure divestment and material disposal were also key facets of enabling the Canadian departure from KAF. As a tenant in KAF and member of NATO for the ISAF mission, the disposal or transfer of Canadian infrastructure was done locally with Commander KAF agreement. However, the planning for that last aspect of the Canadian move commenced much earlier in October 2010 at the NATO level and during fall 2011 was brought to fruition by the MTTF in KAF as part of the final mission close out.[84]

Most of the permanent infrastructure was transferred to American forces and some relocatable facilities, in particular the Expeditionary Forces Aircraft Shelter System (EFASS), were sold to other NATO allies. Infrastructure and related material

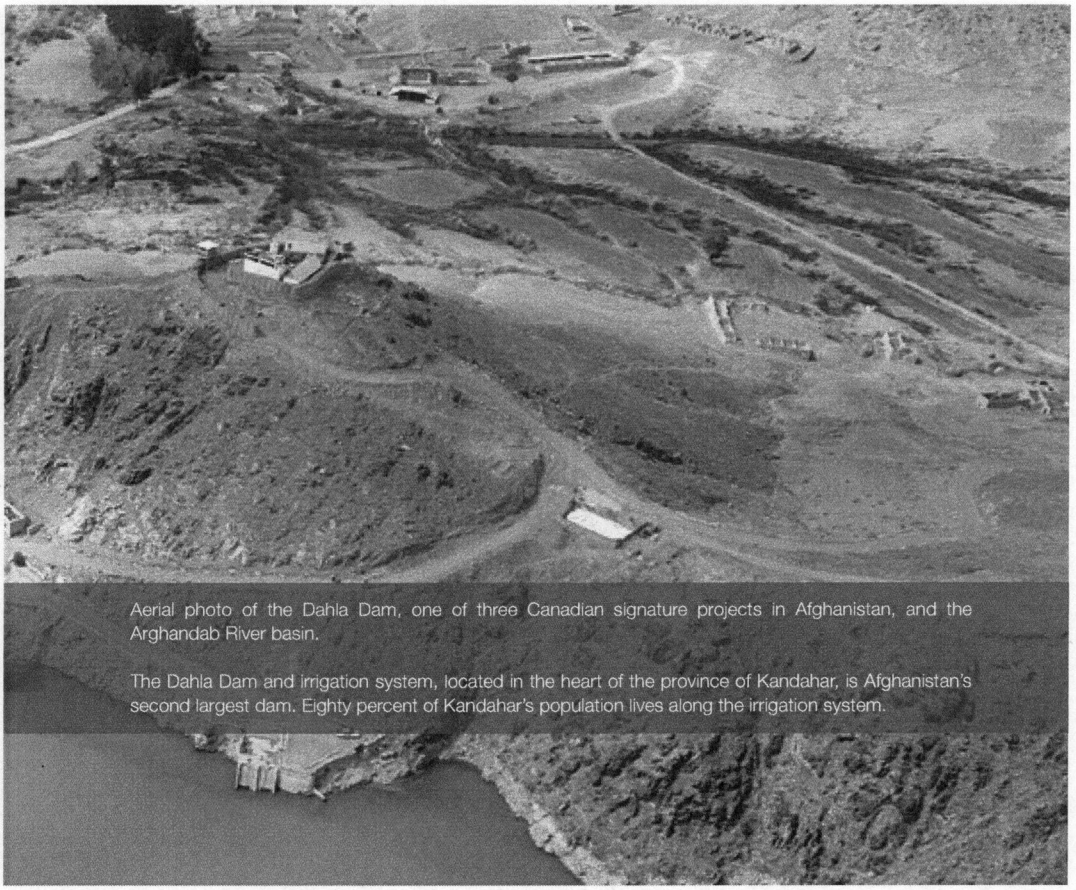
84. For a detailed examination of the planning and execution of the infrastructure divestment at KAF, see Canada, Department of National Defence, Headquarters Mission Transition Task Force, "3500-1 (JLLO) Topic Report 11-101 Planning Permanent Infrastructure Disposal," 23 November 2011.

Source: Combat Camera AR2011-0061-066

divestment was organized and coordinated by the infrastructure officer within the MTTF Engineer Regiment. Early and continuous discussion was crucial to establishing and adhering to timelines for handover of these last vestiges of the Canadian presence at KAF. These dates were based on three key milestones:

1. Engineer Day (E-Day)-45. About six weeks from E-Day, a handover team from the incoming group visited the facility and met with a handover representative from the outgoing group and present were subject matter experts—engineers, signals, camp services, etc—who could answer questions about the facility. It also provided an opportunity to the incoming group to conduct a reconnaissance. It was at that time that actions that required completion by the outgoing occupants were confirmed, as was the list of material to be left behind.

2. E-Day. The occupants handed over the facility to the engineers. The handover team from the incoming unit again visited the infrastructure and verified that all actions had been completed and agreed upon material



Aerial photo of the Dahla Dam, one of three Canadian signature projects in Afghanistan, and the Arghandab River basin.

The Dahla Dam and irrigation system, located in the heart of the province of Kandahar, is Afghanistan's second largest dam. Eighty percent of Kandahar's population lives along the irrigation system.

left behind. E-Day preceded the actual transfer of the facility with enough time to deal with any work, including environmental remediation, that needed to be completed.

3. Transfer Day (T-Day). Transfer of ownership occurred and all aspects of the infrastructure became the responsibility of the new owner of the facility. The day had been coordinated with Commander KAF and was formalized by a letter from Commander MTTF.[85]

In this fashion, and under engineer supervision, the Canadian imprint in KAF diminished until December 2011, when the MTTF left Kandahar Airfield. With the departure of those last members of the CF, the military engineer presence in southern Afghanistan ended after nearly seven continuous years.[86]

85. See the enclosure to Canada, Department of National Defence, Headquarters Mission Transition Task Force, "3500-1 (JLLO) Topic Report 11-115 Drawdown and Divestment of Infrastructure," 3 December 2011, 1–2.

86. *Ottawa Citizen*, "Blogs, News, Defence Watch, Defence Watch RSS: Last Canadian Soldiers from Kandahar to Arrive Home on Thursday," (14 December 2011, 4:26 PM) available at http://archive.today/765of#selecti on-2168.0-2168.1; Internet, accessed 5 October 2014, n.p.

PART 5 – CONCLUSION

> It is important to be able to draw on everything that you've been taught in both your branch and all-arms tactical training...even what people would be quick to dismiss as 'Cold War stuff' still applies. We're still using the same bullets, bombs and sandbags.[87]
>
> —*MAJOR NILS FRENCH, ENGINEER PLANS OFFICER, TASK FORCE KANDAHAR HEADQUARTERS 5-09 (2009)*

That thought by a military engineer staff officer encapsulates the experience of Canada's military engineers in southern Afghanistan, "*Plus ça change...*" The engineer lessons identified during the theatre activation in 2005–2006, combat operations from 2006–2011 and close down in 2011 reflect integrated whole-of-government operations in addition to the changing nature of the war. Through the dilemmas posed by the activities undertaken to empower security and capacity-building activities, Canada's military engineers learned and relearned a great deal in Afghanistan. The ability of the military engineers, as part of the overall effort, to address the complex dilemmas of the southern Afghanistan mission was the result of the efforts of all those who served from 2006 onwards. This work and sacrifice underpinned any progress experienced during the latter years of the mission, in 2009–2011. All Canadian field partners—the Afghan National Security Forces, other Canadian agencies, such as DFAIT and CIDA, in conjunction with the work of allied militaries and government agencies played a part in any overall success achieved.[88]

The achievements of the latter years of the deployment were greatly facilitated by the circumstances that permitted the formation of the TFK Engineer Regiment, providing centralized command and control coupled with decentralized execution. This structure facilitated the prioritization and conduct of engineer-specific tasks. It must be acknowledged that, while adhering to doctrinal precepts for command and control, the unit that was constructed was not the combat engineer regiment of a tactical formation, the engineer support regiment of a theatre, or an ESU but, instead, a task-tailored organization, crossing lines of engineer operations that provided advice in addition to operational- and tactical-level engineering support.

It may be that, given the nature of the contemporary environment and likely future Canadian Armed Forces missions, the lines between operational, or theatre, and tactical engineering support, particularly as part of whole-of-government operations, will continue to blur those military divisions. What is apparent is that the ability to have a structure that makes it possible to prioritize and assign military engineer forces to appropriate engineer tasks, along with the command and control arrangement that allows for that apportionment, is something that must be carefully

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87. E-mail from Major Nils French, Engineer Plans Officer, Task Force Kandahar Headquarters 5-09 to Lieutenant Colonel JB McNair, Canadian Land Forces Command and Staff College, dated Tuesday, 17 November 2009, 8:11 PM, n.p. [In possession of author]

88. Dr. Howard G. Coombs, "APLN.06.03.LÈ Introduction to the Comprehensive Approach to Operations in a Joint, Inter-Agency, Multinational and Public Environment," presentation to the Army Operations Course, Canadian Army Command and Staff College, Kingston, ON (31 October 2011), slide 43.

thought through prior to any deployment. Despite a less than optimal start regarding the organization of engineer forces in southern Afghanistan, the eventual creation of the TFK Engineer Regiment was a positive evolution and was successful in providing all types of engineering support. That evolution of engineer command and control also reaffirmed long standing doctrinal exigencies concerning the employment of engineers. Along with that, it must be noted that, given the myriad of roles fulfilled by that type of task, tailored unit force generation will likely prove challenging and is not to be underestimated.[89] There will also be a need to ensure that the appropriate equipment, spare parts, technicians and operators are part of the effort as is the necessary engineering material. Furthermore, the need to have adequate replacements trained for deployed units was highlighted. One way in which that could be addressed is to simply increase the size of reinforcement pools beyond the normal 10 per cent for future missions. Likewise, the ability to connect to institutions and organizations outside the theatre for consultation and sometimes support enhances and provides depth to the technical abilities of those conducting engineer projects.

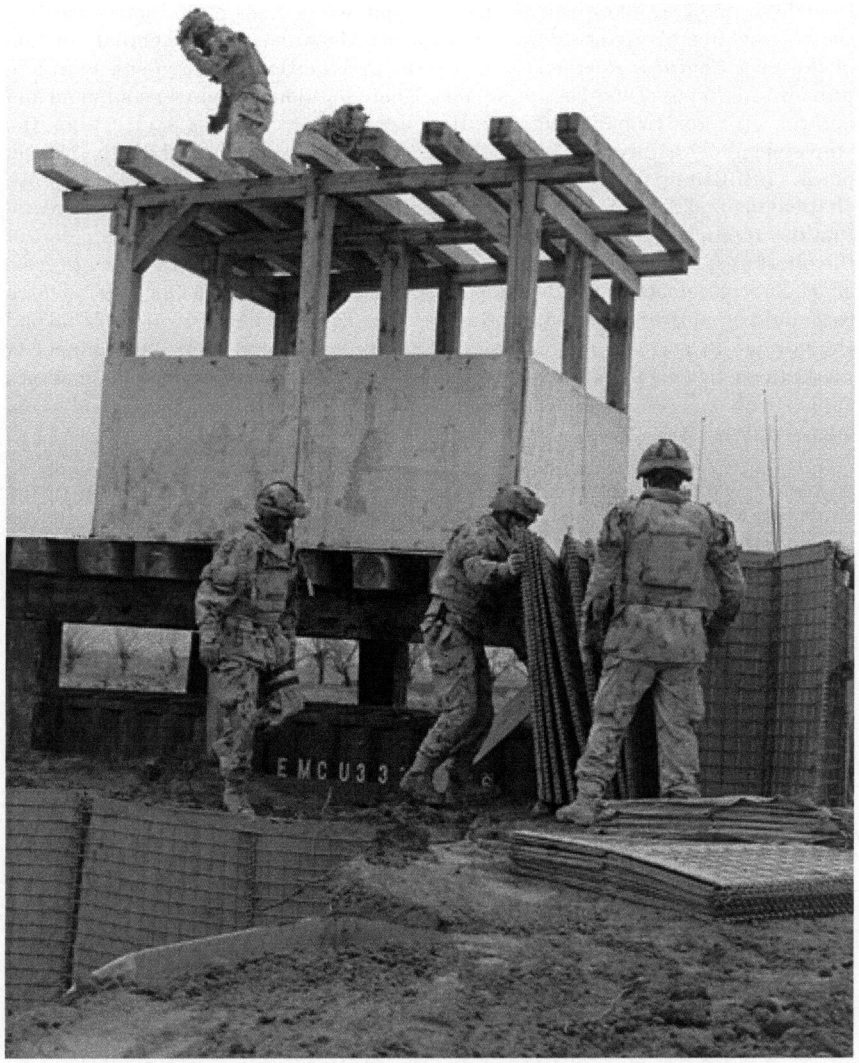
As part of that, the abilities of the CMO to provide a robust and timely contracting capability were unsurpassed. That responsiveness was further improved by the incorporation of members of Defence Construction Canada, as they provided an in-theatre capability to tender and manage intricate construction contracts. However, it is evident from the operations that were conducted that local contracting should only be used to deal with those projects not critical to the campaign. In such cases, organic engineer assets should be used.[90] In a related fashion, the ESS and SET capabilities were also a crucial piece of this multi-faceted effort.

Moreover, there is an art to employing engineers properly. One of the main challenges in communicating the appropriate employment of engineers is creating an understanding of the wide breadth of engineer capabilities and thoroughly integrating engineer advice into mission analysis and planning and throughout the conduct of operations. The relationship between arms needs to be strong, and advice needs to be relevant, timely and accurate. Resultantly, this education and the trust that follows from it need to be firmly established as early as possible at all levels and prior to deployments through continuous combined arms training. It is simply too late to establish a working professional relationship during a deployment or to ameliorate the frictions that inevitably occur between the demands of a supported commander and the realities faced by the supporting engineer elements. In that light, engineer advisors must possess the rank and expertise appropriate to their role to ensure that they are heeded and, wherever possible, deploying units must train with the headquarters that they will serve with over the course of a mission.

This inter-arms relationship is similarly enabled by ensuring that military engineers at all levels possess the gamut of professional competencies necessary to provide appropriate and informed advice to supported commanders. That means that

89. Enclosure to Canada, Department of National Defence, Task Force Kandahar, "3350-1 (ALLO) Topic Lesson Report (TLR) – 10-061 Military Engineer Support to Operations (Draft)," n.d.

90. Canada, Department of National Defence, Task Force Kandahar, "3350-1 (ALLO) Topic Lesson Report (TLR) – 10-061 Military Engineer Support to Operations (Draft)," n.d., 2.



Canada's military engineers must continually review individual and collective training to ensure the breadth and depth of engineer skills are taught and reinforced at the correct ranks. While core classification training was modified as a result of the Afghan experience, it is evident that much military engineer training and concepts stood the test of combat reasonably well. The challenge will be in determining what needs to be retained as core skills in coming years. A periodic end-to-end review of training will always be necessary to ensure that training maintains the core skills that consistently meet the needs of the perpetually changing security environment—the *longue durée*—and not simply those that address the imperatives of the most recent war.

Classification training must develop in military engineers the ability to communicate all-arms skills, particularly in ETHAR, to supported units, and to encourage other classifications to make that a part of their general skills. Only in that fashion will the limited numbers of military engineers be prioritized to engineer specific tasks during deployments rather than spending time and effort addressing other tasks that can be completed by other members of the combined arms team. This also reinforces the long-standing principle of centralized command and control and decentralized execution. However, at the same time, it must be highlighted that the incorporation of other combat arms into engineer tasks to provide force protection frees up greater numbers of military engineers for sapper duties.

Furthermore, the continuity and management of information proved particularly problematic throughout the mission. Everything from geomatic information to engineer intelligence on evolving threats did not seem to persist more than two or three rotations. One suspects that that is not an engineer-specific challenge and that the solutions to the collation, storage and retrieval of information need involve a coherent, systematic approach on the part of all members of the mission. Also, in addition to the formalized process for lessons learned, information gained during operations needs to be shared between all Canadian Army engineer units as well as between force employing and generating headquarters, military schools, joint force and other environmental engineer organizations.

Finally, it is necessary to note that early preparation and planning is an incredibly important part of how both theatre activation and closedown are carried out. While it seems intuitive that the manner in which one starts is critical to prepare the mission for success and that the fashion in which one ends a deployment allows one to conclude cleanly, it also enables future missions through the transition of vital engineer equipment and material. On top of that, the exit from a deployment provides friends and allies with their final lasting perspective on "the Canadians." Both TF Holdfast and the MTTF Engineer Regiment achieved great results, but that did not always happen smoothly. The necessity for timely engineer input into early planning, a well-structured and equipped organization, a deliberate and measured plan, and a transparent and easily understood process is evident from both experiences.

Generally, the consolidation of engineer resources in KAF and the divestment of engineer-related equipment and material occurred in a reasonably efficacious manner. The elements to success were creating accurate information on the materiel to be recovered and divested and understanding the nuances required for handover of the TI. Accurate and vigilant management of Canadian stores and equipment will greatly simplify the logistical effort to consolidate and redeploy. One aspect of the handover that could have used more emphasis prior to the RiP was developing a good appreciation of the replacement forces' capabilities. A relief in place with non-Canadian follow-on forces will always present unique challenges as a result of different concepts for support. A greater understanding of American procedures and policies would have enabled an appreciation of their capacities and limitations, which would have reduced points of friction in an already complex process. Lastly, redeployment planning likely needs to commence in-theatre prior to the last rotation, which must contain an element that will conceptualize the ways in which the transition will occur and then function in tandem at the end of the final rotation with the mission close-out forces to ensure a smooth transition.

When examining the lessons identified through the efforts and sacrifices of Canadian military engineers in southern Afghanistan, it is necessary to put them into context and be brutally honest concerning the events, both good and bad, that transpired throughout the commitment. Not doing so would be dishonest and a disservice to those Canadian military engineers who follow.[91] As part of that, it is always necessary to ensure that the price paid for such information is remembered. The following excerpt was taken from the address given by Major Mark Gasparotto in May 2007 at 2 Combat Engineer Regiment, Canadian Forces Base Petawawa, during the dedication of a memorial to Sergeant Shane Stachnik:

> We gather here today, not only to pay our respects to Sgt Stachnik and offer our continued condolences to Shane's family, but also for some closure for ourselves. Life is for the living, so my hope is, that not only will I be telling you things that you already know, but that you have already acted upon...[92]

While Major (now Lieutenant-Colonel) Gasparotto's words speak to all who served and remind one of the cost of war, they also provide impetus to remember and institutionalize the Canadian military engineer knowledge recognized as important in Afghanistan. The primary lessons identified in this report are not simply artefacts of a recently ended conflict; rather, they provide information relevant to current and future operations. Also, it cannot be emphasized sufficiently that Canada's Military Engineers gained this data as a result of efforts and sacrifice. Lives lost and damaged will be diminished if we do not remember and institutionalize this hard won knowledge to truly ensure that it becomes "lessons learned."

We will remember.

We must remember.

COLONEL HOWARD G. COOMBS is an assistant professor at the Royal Military College of Canada and a part-time Army Reserve officer with 4th Canadian Division Headquarters. Coombs served in Kabul in 2004 as an Army reservist working directly for the Commander International Security Assistance Force as a strategic planner. He deployed to Kandahar with Joint Task Force Afghanistan from September 2010 to July 2011 as a civilian advisor to the task force commander.

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91. Mark Gasparotto, "Introduction," in *Clearing the Way: Combat Engineers in Kandahar – 23 Field Squadron*, Major Mark Gasparotto, ed. (London, Ontario: Ardith Publishing, 2010), 23.

92. The full text of this tribute is available in Mark Gasparotto, "Epilogue," in *Clearing the Way: Combat Engineers in Kandahar – 23 Field Squadron*, Major Mark Gasparotto, ed. (London, Ontario: Ardith Publishing, 2010), 147–49.

Source: Combat Camera IS2006-1161

Deployment Health Surveillance in Action: 18 months of Data from the Canadian Armed Forces Health Facility in Kabul, Afghanistan

Introduction/Purpose: This study provides a unique overview of a year and a half worth of health surveillance efforts from Operation ADDENDA in Kabul, Afghanistan. This ongoing operation facilitates the day-to-day activities of the Canadian embassy, and the Role 1 health facility at this location serves almost equal numbers of both military and civilian personnel. The information presented in the report details the findings captured by the CAF deployment health surveillance system, and provides an update of the utility of the DISS in a long-term deployment context.

Methods: The Disease and Injury Surveillance System (DISS) is an automated electronic coding system that captures health information on medical visits in deployed settings. In addition to meeting Epi-NATO reporting standards, the DISS collects information on primary diagnoses, as well as injury mechanisms and outbreak markers. The data extracted for this report covered the surveillance period of 07 June 2015 to 31 Jan 2017. Frequencies and distributions of primary diagnoses, injuries, and specialist referrals were calculated based on the total number of medical visits. Special focus is given to period trends of key outbreak indicators (i.e., upper respiratory tract infections, lower respiratory tract infections, gastrointestinal, climactic and fever indicators). All analyses were performed in STATA 14.0 and Microsoft Excel 2010.

Results: A total of 846 medical encounters occurred over this 18-month period, corresponding to 413 visits (48.8%) by CAF personnel, 406 civilian visits (48.0%), and 27 visits (3.2%) by other military personnel. The majority of civilians treated during this period were male (66.5%). The primary reasons for medical visits for all groups included vaccinations (n=120), diseases of the respiratory tract (n=105), and injuries (n=78). The distribution of all diagnoses by ICD-10 category is provided. Within CAF personnel, 76 injuries were reported which were either sport or non-battle non-sport related. In addition, a total of 10 specialist referrals were made and a minimum of 11.5 days of duty were lost. A breakdown of the 61 outbreak indicators reported during this period are presented by month to illustrate seasonal trends.

Conclusions: The ongoing deployment health surveillance efforts in Kabul, Afghanistan using the DISS have allowed for the capture of a comprehensive range of health conditions and operational impacts. This information can be used to facilitate resource planning, track outbreaks and quantify the burden of disease arising from a given mission. Future linkage with reliable denominator data could strengthen the utility of this data and its potential applications.

Lay Abstract (50 words): This study provides an overview of 18 months of health surveillance efforts from Operation ADDENDA in Kabul, Afghanistan. It demonstrates that the automated electronic Disease and Injury Surveillance System (DISS) enables the successful capture of a comprehensive range of health conditions and operational impacts in a deployment setting.

Disease and Injury Surveillance Op Addenda Summary Report for Roto 5

16 August 2016 to 31 January 2017

Prepared for: LCol Forestier
Prepared by: Kiyuri Naicker
Reviewed by: Christine Dubiniecki
DFHP Epidemiology section

February 23, 2017

Op ADDENDA Roto 5 Disease Injury Surveillance System Summary Report

INTRODUCTION

The report includes a summary of the main disease and injury findings reported in the Disease and Injury Surveillance System (DISS) by health personnel in Op ADDENDA Roto 5, between August 16th 2016 and January 31st 2017. The results presented cover the frequency and distribution of first and follow-up visits, primary diagnoses or main reasons for visits, outbreak indicators, injuries and types of injury mechanisms. This report also describes the number of excused-duty days, light-duty days and total days lost due to duty restrictions.

DISS data was collected on all personnel that were treated at the Kabul (Afghanistan) treatment facility during Roto 5, and includes Canadian Armed Forces (CAF) members deployed as part of Op ADDENDA, civilians from the Canadian Diplomatic Mission in Kabul , and other personnel (i.e., civilians from other diplomatic allied countries and NGO's).

The DISS DWAN version of the application was used to input the information presented. The information captured by the system was UNCLASSIFIED and contains no personal identifiers or identifying variables for CAF personnel.

Limitations

Information on sex and age group was collected only for the civilian population. To avoid any potential residual disclosure, this report contains only aggregated data. As it was not possible to estimate the denominator for each demographic group, results are provided by counts only. Statistical tests were therefore not computed to determine whether changes in disease frequency were statistically significant or due to random fluctuation. Consequently, disease trends presented in this report should be interpreted with caution.

OVERALL FINDINGS

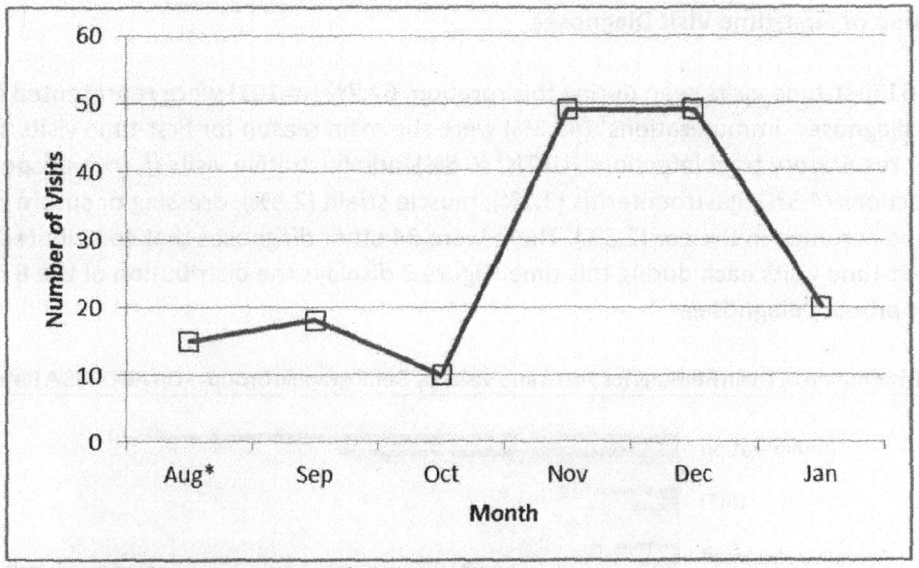
A total of 169 medical visits took place from August 16th 2017 to January 31st 2017, with an average of less than one visit per day. Ninety-six visits (56.8%) corresponded to civilian personnel, seventy visits (41.2%) corresponded to CAF personnel, and 3 visits (1.8%) to other demographic groups. One hundred sixty one visits corresponded to first-time visits and 8 were follow-up visits (Table 1).

Table 1. Distribution of Visits by Demographic Groups and Visit Type - Op ADDENDA Roto 5

	Visit Type		
Personnel Group	First visit	Follow-up visit	Total
CAF	64	6	70 (41.2%)
Civilian	94	2	96 (56.8%)
Other	3	0	3 (1.8%)
Total	161	8	169 (100.0%)

Overall, the average number of visits per month was 30.7 visits (over 5.5 months, as data were only collected from August 16th 2016). The number of first-time visits was lowest during October (n=10), and increased noticeably in November and December (n=49 visits per month) (Figure 1). Few very follow-up visits occurred during this reporting period (n=8).

Figure 1. Number of visits by month - Op ADDENDA Roto 5



* The month of August contains only 15 days of data

Within the civilian demographic group, the majority of all medical visits corresponded to males (83.3%) and the rest to females (17.7%) when distributed by sex[1] (Table 2).

Table 2. Distribution of Civilian Medical Visits by Sex and Age groups - Op ADDENDA Roto 5

	Sex		
Age Group	**Female**	**Male**	**Total**
20 to 24	1 (5.9%)	1 (1.3%)	2 (2.1%)
25 to 29	3 (18.0%)	5 (6.3%)	8 (8.3%)
30 to 34	8 (47.1%)	28 (35.4%)	36 (37.5%)
35 to 39	0 (0.0%)	20 (25.3%)	20 (20.8%)
40 to 44	1 (5.9%)	11 (13.9%)	12 (13.2%)
45 to 49	0 (0.0%)	4 (5.1%)	4 (4.2%)
50 to 54	0 (0.0%)	2 (2.5%)	2 (2.1%)
55 to 59	4 (23.5%)	7 (8.9%)	11 (11.5%)
60 to 64	0 (0.0%)	1 (1.3%)	1 (1.0%)
TOTAL	**17 (17.7%)**	**79 (83.3%)**	**96 (100%)**

[1] Age group and sex information is only captured for civilians

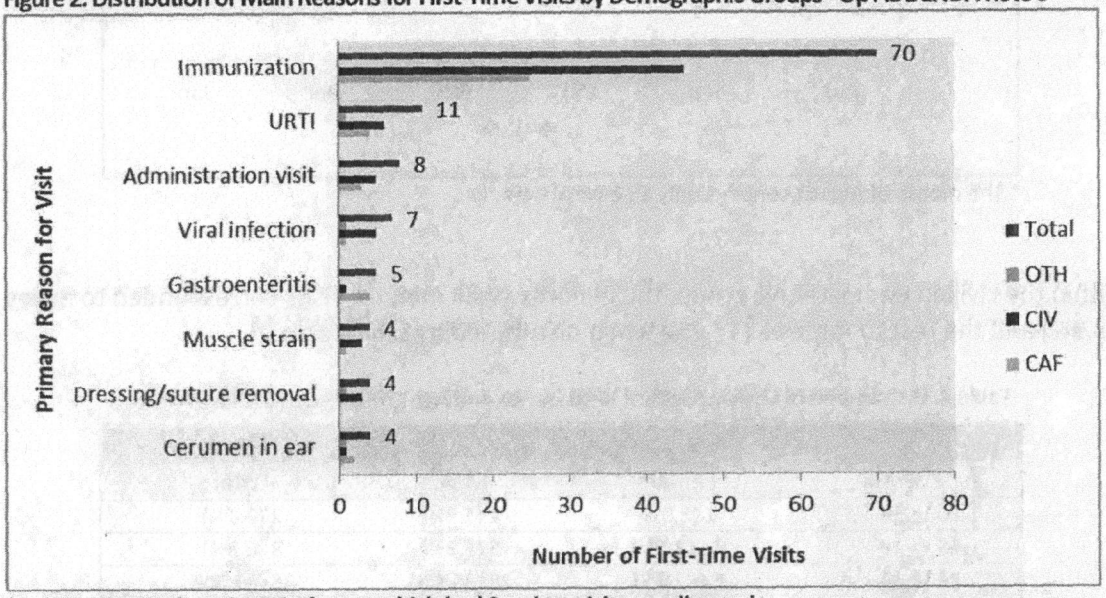
With respect to age groups, 88.5% of the medical visits occurred in civilians between 30 to 59 years of age. The highest number of medical visits occurred in the 30 to 34 age group for both females (35.7%) and males (33.8%).

NOTE: All analyses in the remainder of this report will be based on first-time visits (n=155) only.

Description of First-time Visit Diagnoses

Of the 161 first-time visits seen during this rotation, 62.7% (n=101) were represented by 8 primary diagnoses. Immunizations[1] (43.5%) were the main reason for first-time visits, followed by upper respiratory tract infections (URTIs) (6.8%), administrative visits (5.0%), unspecified viral infections (4.3%), gastroenteritis (3.1%), muscle strain (2.5%), dressing or suture removal (2.5%) and cerumen in the ear (2.5%). There were 34 other diagnoses that contributed 3 or fewer first-time visits each during this time. Figure 2 displays the distribution of the 8 most frequent primary diagnoses.

Figure 2. Distribution of Main Reasons for First-Time Visits by Demographic Groups - Op ADDENDA Roto 5*



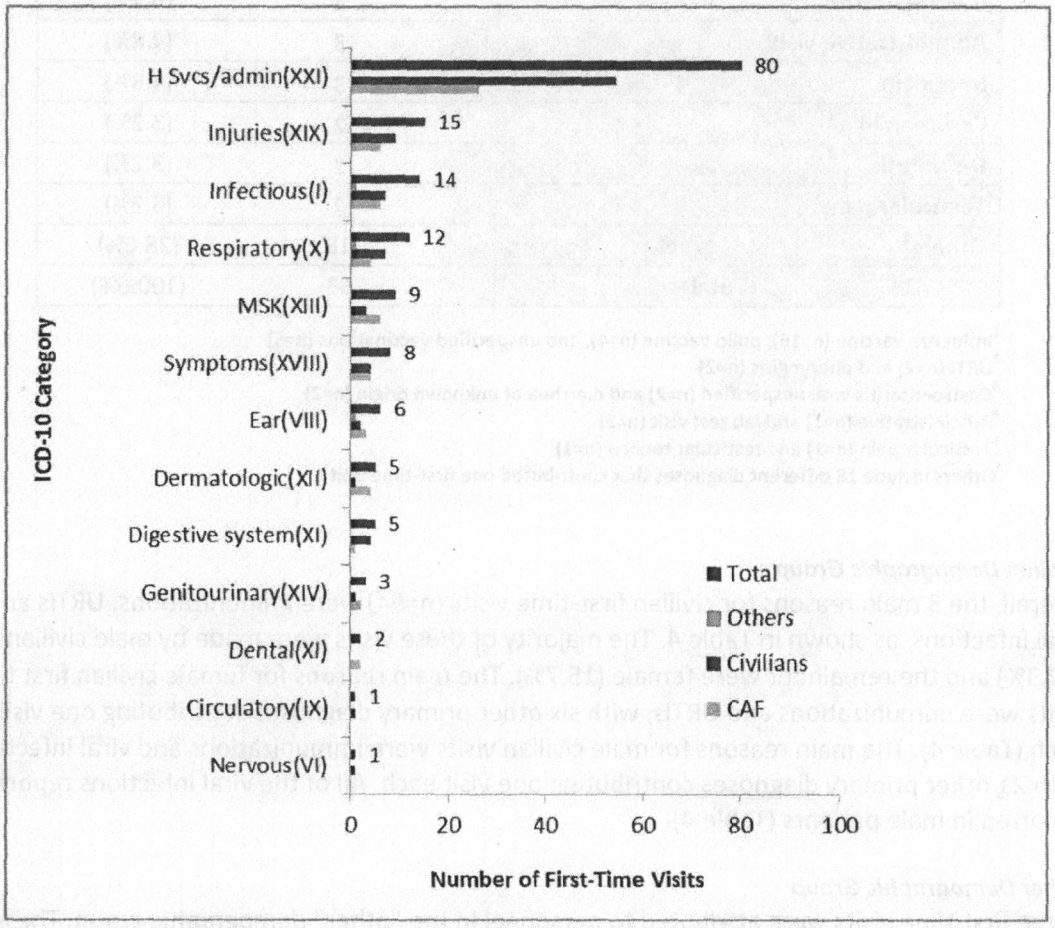
***Not represented are 34.8% of cases which had 3 or less visits per diagnosis.**

When grouped by ICD-10 categories[2] as shown in Figure 3, the most frequent first-time visits (49.7%) were classified as health services or administrative visits (Category XXI), followed by 9.3% due to injury, poisoning and certain other consequences of external causes (Category XIX), and 8.7% due to infectious diseases (Category I). An additional 7.5% of first-time visits were due to diseases of the respiratory system (Category X), 5.6% were related to musculoskeletal

[1] Immunizations include: influenza vaccination (n=60), polio vaccination (n=5), and unspecified (n=5)
[2] International Classification of Diseases is the WHO diagnostic classification standard.

problems (Category XIII), and 5.0% to symptoms and abnormal clinical/laboratory findings not otherwise classified (Category XVIII). The remaining 7 categories collectively represented 15.2% of all first-time visits.

Figure 3. Distribution of First-time Visits by ICD-10 Category and Demographic Group – Op ADDENDA Roto 5



Description of First-time Visit Diagnoses by Demographic Group

CAF Demographic Group

Of the sixty-three first-time visits among CAF personnel, the largest proportion (39.7%) was attributed to immunizations (Table 3). Other main reasons for first-time visits during this period included URTIs, gastroenteritis, administrative reasons, back pain, cerumen in ear, dermatitis, and testicular pain as shown in Table 3. There were 18 diagnoses grouped under the "Other" category that contributed one first-time visit each.

Table 3. Distribution of First-time Visits by Diagnoses in CAF Personnel - Op ADDENDA Roto 5

Diagnoses	n	(%)
Immunization[1]	25	(39.7%)
URTI[2]	4	(6.3%)
Gastroenteritis[3]	4	(6.3%)
Administrative visit[4]	3	(4.8%)
Back pain	3	(4.8%)
Cerumen in ear	2	(3.2%)
Dermatitis	2	(3.2%)
Testicular pain[5]	2	(3.2%)
Others[6]	18	(28.6%)
Total	63	(100.0%)

[1]Influenza vaccine (n=16), polio vaccine (n=4), and unspecified vaccinations (n=5)
[2]URTI (n=2) and pharyngitis (n=2)
[3]Gastroenteritis viral unspecified (n=2) and diarrhea of unknown origin (n=2)
[4]Administrative (n=1) and lab test visit (n=2)
[5]Testicular pain (n=1) and testicular torsion (n=1)
[6]Others include 18 different diagnoses that contributed one first-time visit

Civilian Demographic Group

Overall, the 3 main reasons for civilian first-time visits (n=94) were immunizations, URTIs and viral infections, as shown in Table 4. The majority of these visits were made by male civilians (84.3%) and the remainder were female (15.7%). The main reasons for female civilian first time visits were immunizations and URTIs, with six other primary diagnoses contributing one visit each (Table 4). The main reasons for male civilian visits were immunizations and viral infections, with 21 other primary diagnoses contributing one visit each. All of the viral infections reported occurred in male patients (Table 4).

Other Demographic Group

Three first-time visits were attributed to personnel in the "other" demographic group. These were attributed to one case each of pharyngitis, cerumen in ear, and an unspecified viral infection.

Table 4. Distribution of First-time Visits by Diagnoses and Sex in Civilian Personnel - Op ADDENDA Roto 5

Diagnoses	Female	Male	Total	
Immunization[1]	4	41	45	47.9%
URTI[2]	2	4	6	6.4%
Administration visit	3	2	5	5.3%
Viral infection	0	5	5	5.3%
Dressing change/suture removal	0	3	3	3.2%
Muscle strain[3]	2	1	3	3.2%
Other[4]	6	21	27	28.7%
Total	**17**	**77**	**94**	**100.0%**

[1] Immunization unspecified (n=44) and polio immunization (n=1)
[2] URTI unspecified (n=1), acute sinusitis (n=1), pharyngitis (n=3) and common cold (n=1)
[3] Shoulder strain (n=1), neck strain (n=1) and unspecified (n=1)
[4] Others include 23 different diagnoses that contributed one first-time visit only

Reportable Communicable Diseases and Outbreak Markers Indicators

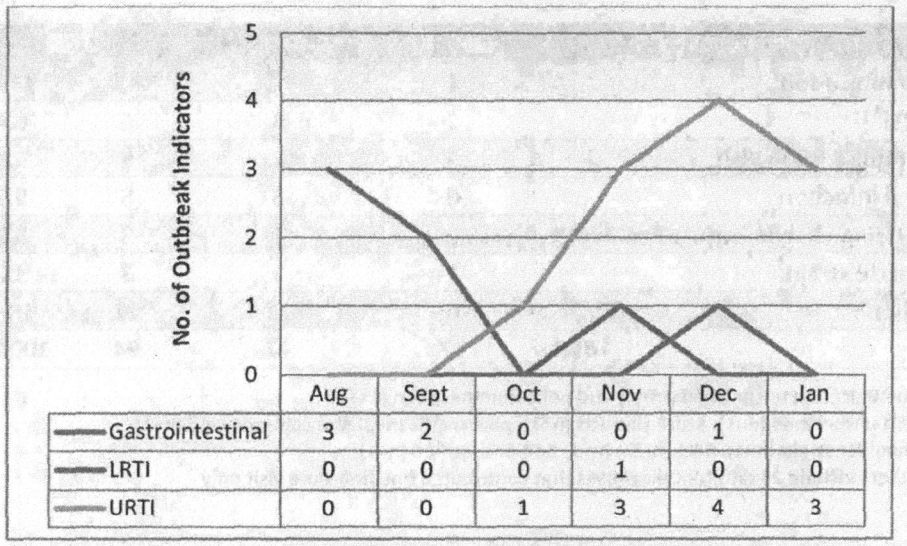
Outbreak indicators[3] are a set of conditions that have been grouped in 5 different categories to help identify outbreaks when the numbers or rates surpass an expected value. A total of 18 outbreak indicators were identified during first-time visits over the 5.5 month period (data displayed on next page). Half of these occurred in CAF personnel (n=9), with the remainder occurring in civilian personnel (n=6) and the "other" demographic group (n=3). URTI outbreak indicators were the most frequently reported (n=11), followed by gastrointestinal (n=6), and lower respiratory tract infection (LRTI) (n=1) indicators.

The number of URTI indicators increased from August (n=0) and peaked in December (n=9), as shown in Figure 4. The number of gastrointestinal indicators decreased from August (n=3) to January (n=0). No climatic nor fever outbreak indicators were reported during this rotation.

No reportable communicable diseases were reported during this period.

[3] Defined by DFHP as: Upper respiratory tract infection (URTI), Lower respiratory tract infection (LRTI), gastrointestinal illness (GI), fever (F), and climatic injuries (C).

Figure 4. Outbreak indicators* by Month for all Demographic Groups - Op ADDENDA Roto 5



	Aug	Sept	Oct	Nov	Dec	Jan
Gastrointestinal	3	2	0	0	1	0
LRTI	0	0	0	1	0	0
URTI	0	0	1	3	4	3

* No climatic nor fever outbreak indicators were reported and thus not included

NB: Any observed changes presented above do not take into account denominator data, and were not tested for statistical non-significance to determine if these differences were due to random fluctuation.

Civilian Demographic Group

Within the civilian demographic group, a total of six outbreak markers were reported during this period (Table 5). URTI outbreak indicators were the most commonly reported (66.7%), followed by one LRTI (16.7%), and one gastrointestinal marker (16.7%). An average of one marker was reported per month in this group.

Table 5. Outbreak indicators* by Month for Civilian Personnel - Op ADDENDA Roto 5

	Aug	Sept	Oct	Nov	Dec	Jan	Total
Gastrointestinal	0	1	0	0	0	0	1
LRTI	0	0	0	1	0	0	1
URTI	0	0	1	0	1	2	4
Total	0	1	1	1	1	2	6

* No climatic nor fever outbreak indicators were reported and thus not included

CAF Demographic Group

Within the CAF demographic group, a total of nine outbreak markers were reported during this period (Table 6). Gastrointestinal outbreak indicators accounted for 55.5%, and URTI outbreak

marker indicators accounted for the remaining 44.4%. An average of 1.6 markers was reported per month in this group. No outstanding findings were observed.

Table 6. Outbreak indicators* by Month for Civilian Personnel - Op ADDENDA Roto 5

	Aug	Sept	Oct	Nov	Dec	Jan	Total
Gastrointestinal	3	1	0	0	1	0	5
URTI	0	0	0	2	2	0	4
Total	3	1	0	2	3	0	9

* No climatic nor fever outbreak indicators were reported and thus not included

Injury Incidence

A total of 13 acute and/or chronic injuries occurred during this period for all demographic groups combined, accounting for 8.4% of all first-time visit diagnoses. Eleven of these (84.6%) were non-battle non-sport injuries. The remaining two diagnoses (15.4%) were sport-related (Table 7).

Within the CAF demographic group, a total of 4 injuries were reported. Three of these (37.5%) were non-battle non-sport injuries, and the fourth was sport-related. Within the civilian demographic group, 7 injuries were reported, and all but one were attributed to non-battle non-sport causes (Table 6). In the "Other" demographic group, two non-battle non-sport related injuries were reported.

Table 7. Distribution of Acute Injuries by Demographic Group - Op ADDENDA Roto 5*

DIAGNOSIS	INJURY MECHANISM		
	Non-Battle Non-Sport Injuries	Sport Related Injuries	Total
CAF PERSONNEL			
Muscle strain (back)	0	1	1
Laceration (finger)	1	0	1
Burn (first degree)	1	0	1
Testicular torsion	1	0	1
Total	3 (75.0%)	1 (25.0%)	4 (100.0%)
CIVILIAN PERSONNEL			
Finger sprain	0	1	1
Muscle strain	2	0	1
Puncture wound	1	0	1
Laceration (knee)	1	0	1
Fracture (humerus)	1	0	1
Multiple injuries	1	0	1
Total	6 (80.0%)	1 (20.0%)	7 (100.0%)

Table 7: Continued

DIAGNOSIS	INJURY MECHANISM		
	Non-Battle Non-Sport Injuries	Sport Related Injuries	Total
OTHER PERSONNEL			
Puncture wound	1	0	1
Abrasion (hip)	1	0	1
Total	2 (100.0%)	0 (0.0%)	2 (100.0%)
OVERALL TOTAL	11	2	13

Disposition and Days Lost

There were no duty restrictions and no days lost reported during this period.

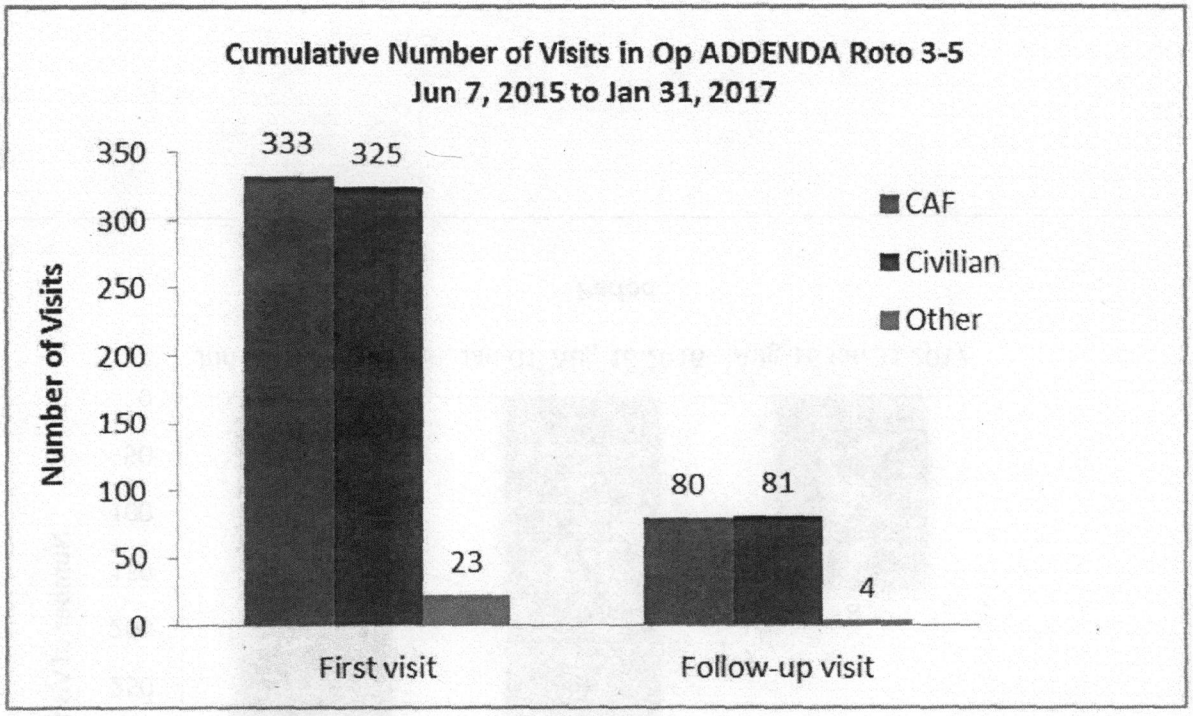
Specialist Referrals

Four specialist referrals occurred for first-time visits during this period. The primary reasons for these referrals included dental pain, fatigue (NYD), lab test visit and testicular torsion.

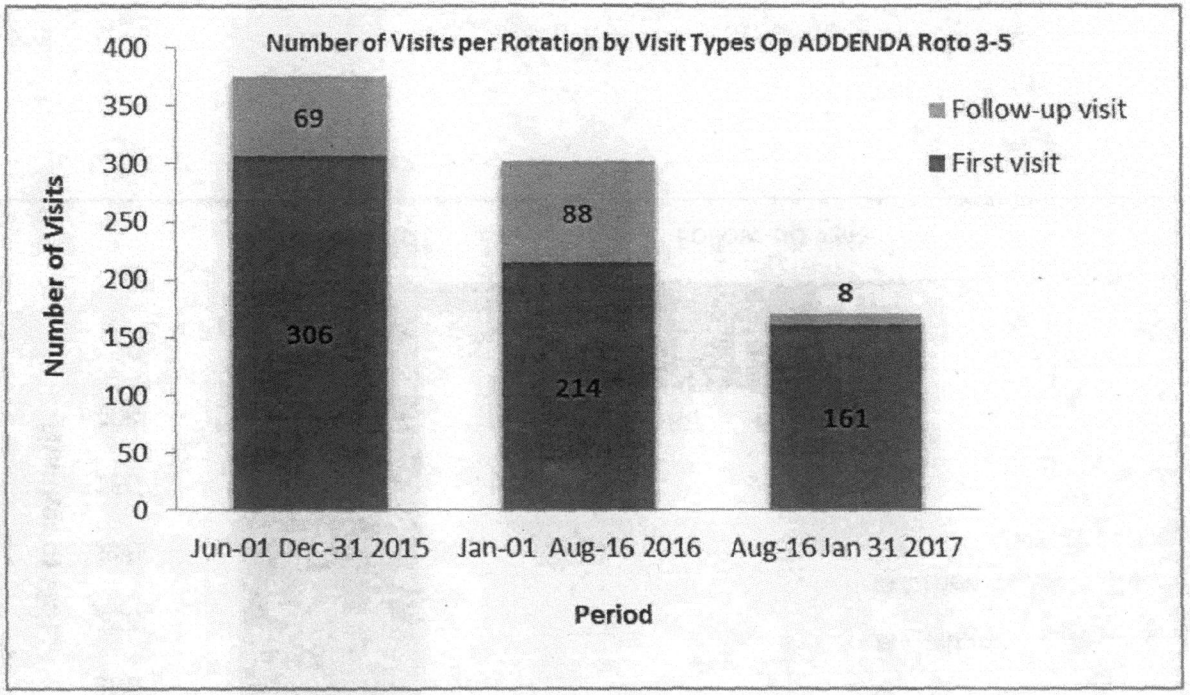
Annexes

Two additional graphs were included as annexes in this document. They display the cumulative information for Op Addenda from Jun 1st, 2015 (Roto 3) through to January 31st, 2017 (Roto 5). All demographic groups are included in the information.

Annex 1. Cumulative number of visits by demographic group and visit type (Roto 3 to 5)



Annex 2. Cumulative number of visits per month by visit type, all demographic groups (Roto 3 to 5)



Disease and Injury Surveillance Op Addenda Summary Report for Roto 4

01 January 2016 to 15 August 2016

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DFHP Epidemiology section

September 16, 2016

Op ADDENDA Roto 4 Disease Injury Surveillance System Summary Report

EXECUTIVE SUMMARY

INTRODUCTION

The report includes a summary of the main disease and injury findings reported in the Disease and Injury Surveillance System (DISS) by health personnel in Op ADDENDA Roto 4, between January 1st and August 15th 2016. The results presented cover the frequency and distribution of first and follow-up visits, primary diagnoses or main reasons for visits, outbreak indicators, injuries and types of injury mechanisms. This report also describes the number of light-duty days and total days lost due to duty restrictions.

DISS data was collected on all personnel that were treated at the Kabul (Afghanistan) treatment facility during Roto 4, and includes Canadian Armed Forces (CAF) members deployed as part of Op ADDENDA, civilians from the Canadian Diplomatic Mission in Kabul, and "other" personnel (i.e., civilians from other diplomatic allied countries and non-governmental organizations (NGOs)).

The DISS DWAN version of the application was used to input the information presented. The information captured by the system was UNCLASSIFIED and contains no personal identifiers or identifying variables for CAF personnel.

Limitations

Information on sex and age group was available only for the civilian population. To avoid any potential residual disclosure, this report contains only aggregated data. As it was not possible to estimate the denominator for each demographic group, results are provided by counts only. Statistical tests were therefore not computed to determine whether changes in disease frequency were statistically significant or due to random fluctuation. Consequently, disease trends presented in this report should be interpreted with caution.

SUMMARY FINDINGS

Overall Findings

Three hundred two medical visits took place from January 1st to August 15th 2016. When stratified by demographic group, 116 (38.4%) corresponded to civilian personnel, 180 visits (59.6%) to CAF personnel, and 6 visits (2.0%) to other personnel. Eighty-eight (29.1%) of these were classified as follow up visits.

For all three demographic groups, the 4 main reasons for first-time visits (n=214) were for post deployment medical exams (n=45; 21.0%), vaccinations (n=28; 13.1%), upper respiratory tract infections (URTIs) (n= 27; 12.6%), and gastroenteritis (n=10; 4.7%).

Findings by Demographic Group

For first-time visits by CAF personnel (n=126), the primary reasons were administrative visits (n=45; 35.7%), followed by vaccinations (n=20; 15.9%), and URTIs (n=10; 7.9%).

Within the civilian demographic group (n=116), females accounted for 44.8% (n=52) of visits overall, and males accounted for 50.0% (n=58) of visits. Six (5.2%) individuals did not have age or sex data entered into their records and were unable to be classified. With respect to age, over 85% of all civilian visits occurred in individuals between 30 and 60 years of age. Among female civilians first-time visits (n=27), the primary reason was vaccination (n=5; 18.5%). The primary reason for first-time visits by males (n=52) was URTI (n=12; 23.1%).

Of the 5 first-time visits attributed to personnel in "other" demographic group, the main primary diagnosis was pharyngitis (2/5; 40.0%).

Reportable Communicable Diseases and Outbreak Markers

During the 7.5 month period, no notifiable communicable disease cases were identified. No disease outbreaks were reported during this time period; however, a higher than average number of URTI indicators (n=12) were observed in the month of February.

Acute Injury Incidence

There were 17 acute injuries reported during this rotation, with roughly equal numbers reported in both the CAF and civilian groups. The majority of these injuries were non-battle and non-sport related (n=12; 70.6%) and the remainder were sport related (n=5; 29.4%). Overall, the most common non-battle and non-sport related injuries reported (n=12) were neck strain (n=3; 25.0%), back strain (n=2; 16.7%), and muscle strain (n=2; 16.7%). The most frequent sport-related injury reported (n=5) was muscle strain (n=3; 60.0%).

Disposition and Days Lost

Two light duty restrictions resulted in 21 light duty days granted. There were 10.5 total days of duty lost during this reporting period.

COMPLETE REPORT

INTRODUCTION

The report includes a summary of the main disease and injury findings reported in the Disease and Injury Surveillance System (DISS) by health personnel in Op ADDENDA Roto 4, between January 1st and August 15th 2016. The results presented cover the frequency and distribution of first and follow-up visits, primary diagnoses or main reasons for visits, outbreak indicators, injuries and types of injury mechanisms. This report also describes the number of excused-duty days, light-duty days and total days lost due to duty restrictions.

DISS data was collected on all personnel that were treated at the Kabul (Afghanistan) treatment facility during Roto 4, and includes Canadian Armed Forces (CAF) members deployed as part of Op ADDENDA, civilians from the Canadian Diplomatic Mission in Kabul , and other personnel (i.e., civilians from other diplomatic allied countries and NGO's).

The DISS DWAN version of the application was used to input the information presented. The information captured by the system was UNCLASSIFIED and contains no personal identifiers or identifying variables for CAF personnel.

Limitations

Information on sex and age group was available only for the civilian population. To avoid any potential residual disclosure, this report contains only aggregated data. As it was not possible to estimate the denominator for each demographic group, results are provided by counts only. Statistical tests were therefore not computed to determine whether changes in disease frequency were statistically significant or due to random fluctuation. Consequently, disease trends presented in this report should be interpreted with caution.

OVERALL FINDINGS

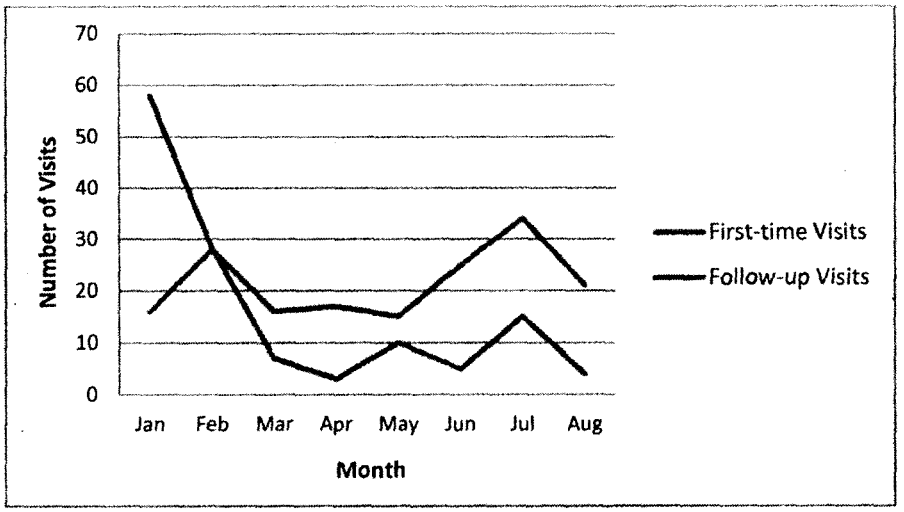
A total of 302 medical visits took place from January 1st to August 15th 2016 (average=1.3 visits per day). One hundred sixteen visits (38.4%) corresponded to civilian personnel, 180 visits (59.6%) to CAF personnel, and 6 visits (2.0%) to other demographic groups. Two hundred fourteen visits (70.9%) corresponded to first-time visits and 88 (29.1%) were follow-up visits (Table 1).

Table 1. Distribution of Visits by Demographic Groups and Visit Type - Op ADDENDA Roto 4

	Visit Type		
Personnel Group	**First visit**	**Follow-up visit**	**Total**
CAF	126	54	180 (59.6%)
Civilian	83	33	116 (38.4%)
Other	5	1	6 (2.0%)
Total	**214**	**88**	**302 (100.0%)**

Overall, the average number of visits per month was 40.3 visits (total visits/7.5 months since data was only collected until August 15th, 2016). The number of first-time visits was highest at the beginning of the year, in January (n= 58) and lowest during the month of May (n=15). In contrast, the number of follow-up visits was highest during the month of February (n=28) and lowest during the month of April (n=3) (Figure 1).

Figure 1. Number of visits by month and type of visit - Op ADDENDA Roto 4



Within the civilian demographic group, 44.8% (n=52) of all medical visits corresponded to females and 50.0% (n=58) visits to males when distributed by sex[1] (Table 2). Six civilians were missing data on age and sex during this rotation and were classified as missing for subsequent analyses.

Table 2. Distribution of Civilian Medical Visits by Sex and Age groups - Op ADDENDA

	Sex		
Age Group	**Female**	**Male**	**Total**
20 to 24	2 (3.8%)	1 (1.7%)	3 (2.6%)
25 to 29	0 (0.0%)	5 (8.6%)	5 (4.3%)
30 to 34	10 (19.2%)	14 (24.1%)	24 (20.7%)
35 to 39	2 (3.8%)	12 (20.7%)	14 (12.1%)
40 to 44	3 (5.8%)	13 (22.4%)	16 (13.8%)
45 to 49	3 (5.8%)	5 (8.6%)	8 (6.9%)
50 to 54	10 (19.2%)	3 (5.2%)	13 (11.2%)
55 to 59	21 (40.4%)	3 (5.2%)	24 (20.7%)
60 to 64	0 (0.0%)	2 (3.4%)	2 (1.7%)
65 to 69	1 (1.9%)	0 (0.0%)	1 (0.9%)
Missing[3]	-	-	**6 (5.2%)**
TOTAL	**52 (44.8%)**	**58 (50.0%)**	**116 (100%)**

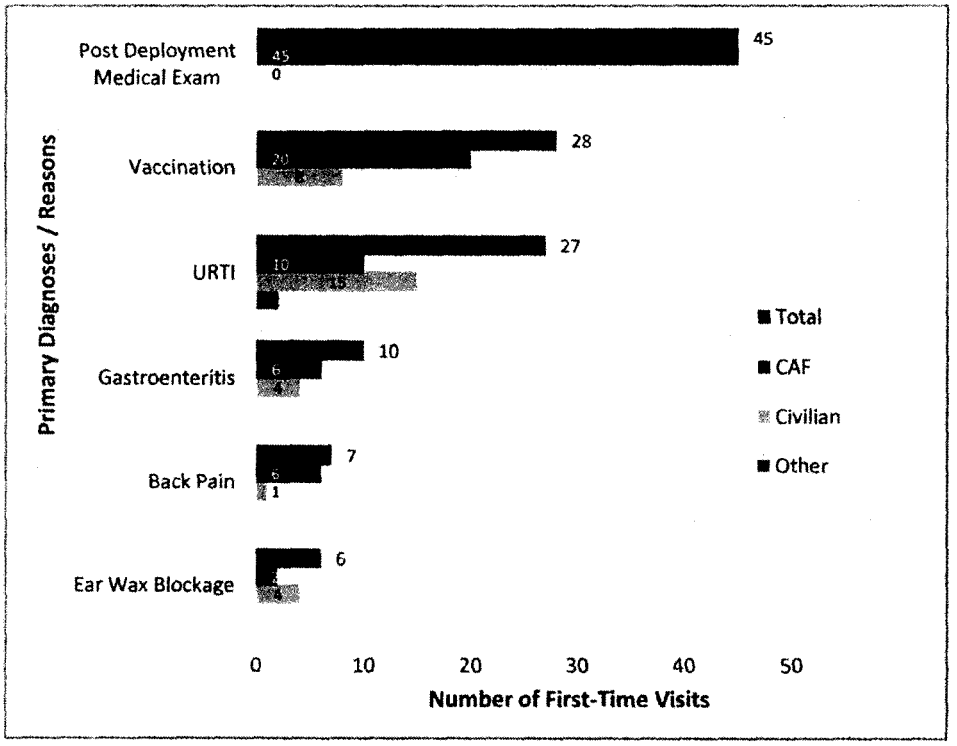
[1] Age group and sex information is only captured for civilians
[3] Data on age and sex was missing for 6 individuals

With respect to age groups, roughly 85% of the medical visits occurred in civilians between 30 to 59 years of age for both sex groups combined. Among visits made by civilian females, the highest number of medical visits (n=21; 40.4%) occurred in the 55 to 59 age group. Conversely, the highest number of visits made by civilian males (n=14; 24.1%) occurred in the 30 to 34 age group.

Description of First-time Visit Diagnoses

Over fifty percent (n=123; 57.4%) of the primary reasons for first-time visits (n=214) overall were represented by 6 diagnoses. Post-deployment medical exams (n=45; 21.0%) were the main reason for first-time visits, followed by vaccinations (n=28; 13.1%), upper respiratory tract infections (URTIs) (n= 27; 12.6%), gastroenteritis (n=10; 4.7%), back pain (n=7; 3.3%), and ear wax blockage (n=6; 2.8%). There were 91 other diagnoses that contributed 5 or fewer first-time visits each during this time. Figure 2 displays the distribution of the 6 most frequent primary diagnoses.

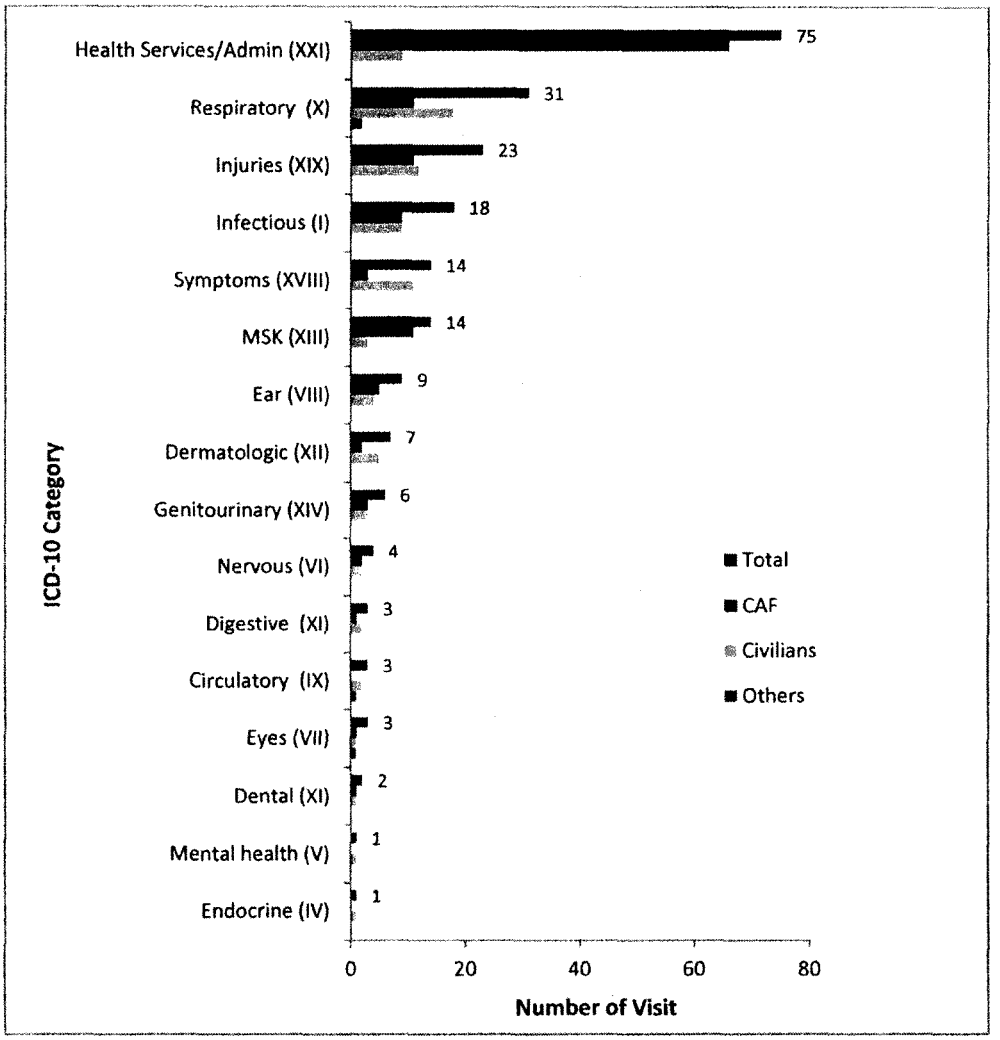
Figure 2. Distribution of Main Reasons for First-Time Visits by Demographic Groups - Op ADDENDA Roto 4*



***Not represented are 42.5% of cases which had 5 or less visits per diagnosis.**

When grouped by ICD-10 categories[2], the most frequent first-time visits (n=75; 35.0%) were classified as health services or administrative visits (Category XXI). Thirty-one first time visits (14.5%) were due to diseases of the respiratory system (Category X), 23 first-time visits (10.8%) were related to injury, poisoning and certain other consequences of external causes (Category XIX), 18 first-time visits (8.4%) were related to infectious diseases (Category I), 14 first-time visits (6.5%) were related to symptoms, signs and abnormal clinical/laboratory findings not otherwise classified (Category XVIII), and an additional 14 first-time visits (6.5%) were related to musculoskeletal problems (Category XIII). The remaining 10 categories collectively represented 39 first-time visits (18.2%).

Figure 3. Distribution of First-time Visits by ICD-10 Category and Demographic Group – Op ADDENDA Roto 4



[2] International Classification of Diseases is the WHO diagnostic classification standard for all clinical and research purposes (including health surveillance).

Description of First-time Visit Diagnoses by Demographic Group

CAF Demographic Group

The majority of first-time visits among the CAF personnel were attributed to post-deployment medical exams (Table 3). Other main reasons for first-time visits during this period included vaccination, URTIs, back pain, form of gastroenteritis, and muscle strain, as shown in Table 3.

Table 3. Distribution of First-time Visits by Diagnoses in the CAF Demographic Group- Op ADDENDA Roto 4

Diagnoses	n	(%)
Post Deployment Medical Exam	45	(35.7%)
Vaccination*	20	(15.9%)
URTI**	10	(7.9%)
Back Pain	6	(4.8%)
Gastroenteritis***	6	(4.8%)
Muscle Strain	4	(3.2%)
Others******	35	(27.8%)
Total	126	(100.0%)

***Vaccination includes polio vaccination**
**** URTI includes URTI unspecified (n=6) and acute sinusitis (n=4)**
***** Gastroenteritis, presumed infectious also gastroenteritis, viral unspecified**
******Others include 35 different diagnoses that contributed ≤2 first-time visits**

Civilian Demographic Group

Overall, the 3 main reasons for civilian first-time visits (n=83) were URTIs (n=15; 18.1%), and vaccinations (n=8; 9.6%), as shown in Table 4. Four first-time visits in this group (4.8%) did not have information on sex recorded. The main reasons for female civilian first time visits (n=27) were vaccinations (n=5; 18.5%) and URTIs (n=3; 11.1%). There were 6 other diagnoses that accounted for 2 first-time visits or less in civilian females. For civilian male first-time visits (n=52), the primary reason for the visit was URTIs (n=12; 23.1%). Three civilian male first-time visits (5.8%) were also reported by for each of the following reasons: vaccinations, malaise, and headaches. There were 31 other diagnoses that accounted for 2 or less in civilian male first-time visits.

Other Demographic Group

Five first-time visits were attributed to personnel in the "other" demographic group. Two of these visits were due to pharyngitis (40.0%). One case each of conjunctivitis (20.0%), hypertension (20.0%), and tics (20.0%) were also identified.

Table 4. Distribution of First-time Visits by Diagnoses and Sex in Civilian Personnel - Op ADDENDA Roto 4*

Diagnoses	Female	Male	Unknown	Total
URTI*	3	12	-	15 (18.1%)
Vaccination**	5	3	-	8 (9.6%)
Ear wax blockage	2	2	-	4 (4.8%)
Gastroenteritis	2	2	-	4 (4.8%)
Malaise	1	3	-	4 (4.8%)
Acute Bronchitis	0	2	1	3 (3.6%)
Headache	0	3	-	3 (3.6%)
Neck Strain	1	1	1	3 (3.6%)
Allergy (environmental)	0	2	-	2 (2.4%)
Back Strain	0	2	-	2 (2.4%)
Cellulitis	0	2	-	2 (2.4%)
Chest Pain (MSK origin)	2	0	-	2 (2.4%)
Fungal Infection	1	1	-	2 (2.4%)
High Blood Pressure	2	0	-	2 (2.4%)
Vaginitis	2	0	-	2 (2.4%)
Others***	6	17	2	25 (30.1%)
Total	27 (32.5%)	52 (62.7%)	4 (4.8%)	83 (100.0%)

*URTI includes acute sinusitis (n=9), URTI unspecified (n=5) and pharyngitis (n=1)
**Vaccination includes polio vaccination
***Others include 25 different diagnoses that contributed a total of 1 first-time visit only

Reportable Communicable Diseases and Outbreak Markers Indicators

Outbreak indicators[3] are a set of conditions that have been grouped in 5 different categories to help identify outbreaks when the numbers or rates surpass an expected value. Any observed changes presented here do not take into account denominator data and were not tested for statistical non-significance to determine if these differences were due to random fluctuation.

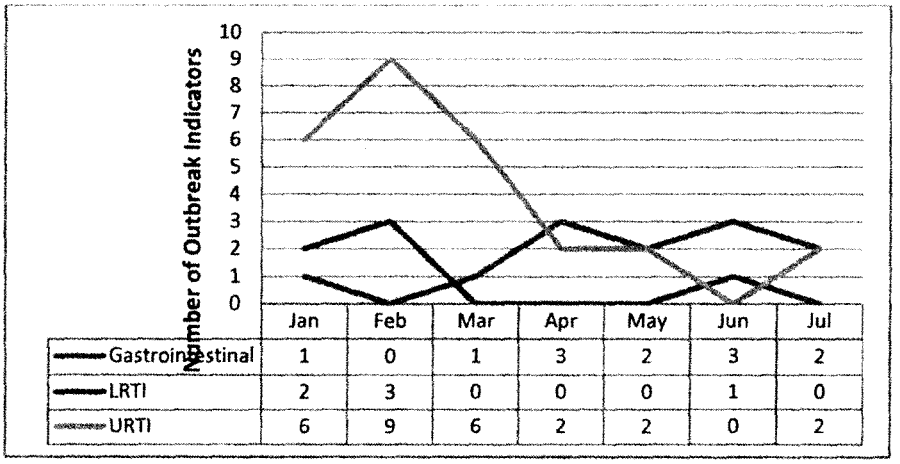
No outbreak indicators were reported for the month of August (note: data collection stopped on Aug 15). During the preceding seven-month period, a total of 45 outbreak indicators were identified during first-time visits. More than half of these occurred in civilian personnel (24/45; 53.3%), with the remainder occurring in CAF personnel (19/45; 42.2%) and the "other" demographic group (2/45; 4.4%). URTI outbreak indicators were the most frequently reported (27/45; 60.0%), followed by gastrointestinal (GI) (12/45; 26.7%), and lower respiratory tract infection (LRTI) (6/45; 13.3%) indicators.

The number of URTI indicators peaked in February (n=9), and then decreased dramatically towards June and July (as shown in Figure 4). Both LRTI and GI outbreak indicators remained

[3] Defined by DFHP as: Upper respiratory tract infection (URTI), Lower respiratory tract infection (LRTI), gastrointestinal illness (GI), fever (F), and climatic injuries (C).

under 3 cases per month for the entire seven-month period. No climatic nor fever outbreak indicators were reported during this rotation.

Figure 4. Outbreak indicators* by Month for all Demographic Groups - Op ADDENDA Roto 4*



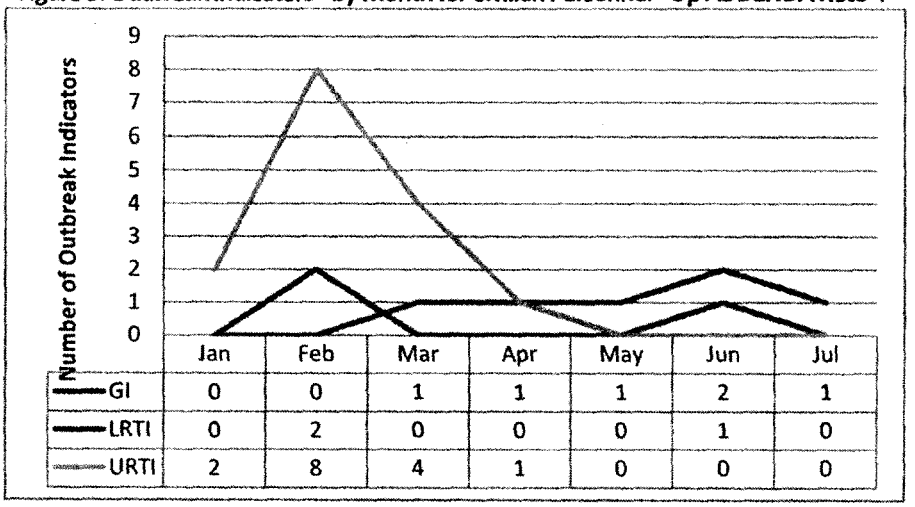
	Jan	Feb	Mar	Apr	May	Jun	Jul
Gastrointestinal	1	0	1	3	2	3	2
LRTI	2	3	0	0	0	1	0
URTI	6	9	6	2	2	0	2

*** No climatic nor fever outbreak indicators were reported thus not include in the graph**

Civilian Demographic Group

When stratifying by demographic groups, the majority of URTI outbreak indicators were identified in the civilian group in the month of February (8/45; 17.8%). Figure 5 displays one large peak of URTI indicators during this month, tapering off to no cases from May through to July. The increased counts of URTI during the winter months are suggestive that infectious upper respiratory conditions may have been influenced by seasonal trends (decreasing as the temperature increased). Gastrointestinal and LRTI indicators remained at 2 cases per month or less during the entire period in the civilian group (Figure 5).

Figure 5. Outbreak indicators* by Month for Civilian Personnel - Op ADDENDA Roto 4*



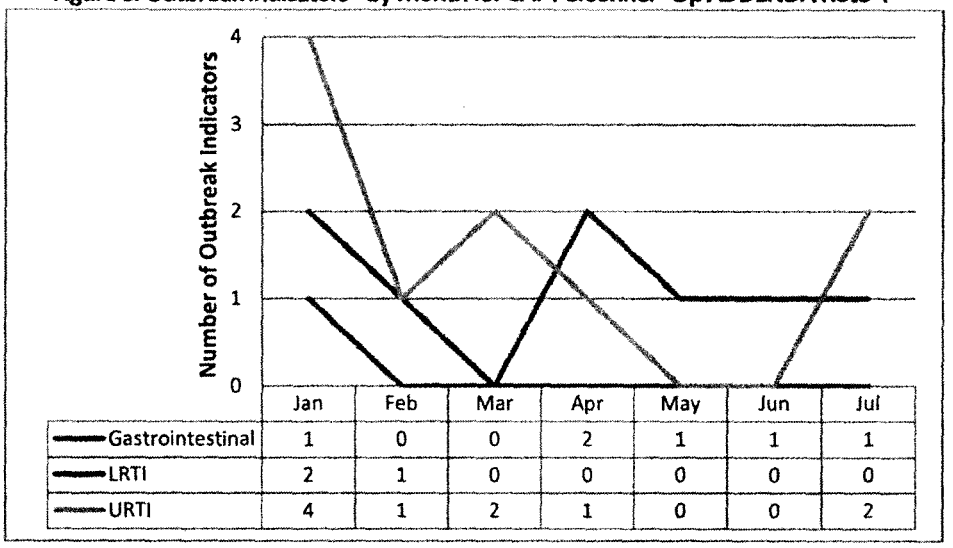
	Jan	Feb	Mar	Apr	May	Jun	Jul
GI	0	0	1	1	1	2	1
LRTI	0	2	0	0	0	1	0
URTI	2	8	4	1	0	0	0

*** No climatic nor fever outbreak indicators were reported thus not include in the graph**

CAF Demographic Group

The graph in Figure 6 displays the patterns of outbreak indicators for the CAF demographic group. A total of 10 URTI (52.6%), 6 gastrointestinal (31.6%), and 3 LRTI (15.8%) indicators were identified in the CAF during this rotation. The highest frequency of indicators for CAF personnel was reported in January (n=7/19; 36.8%) with URTI making up the majority of these cases (n=4/19; 21.1%). The number of outbreak indicators reported from February to July, within CAF personnel, remained very low (between 0 to 3 cases).

Figure 6. Outbreak indicators* by Month for CAF Personnel - Op ADDENDA Roto 4*



	Jan	Feb	Mar	Apr	May	Jun	Jul
Gastrointestinal	1	0	0	2	1	1	1
LRTI	2	1	0	0	0	0	0
URTI	4	1	2	1	0	0	2

*** No climatic nor fever outbreak indicators were reported thus not included**

Acute Injury Incidence

Seventeen acute injuries occurred during this period for all demographic groups combined, accounting for 7.9% of all first-time visit diagnoses. Twelve of these (70.6%) were non-battle non-sport injuries (Table 6). The remaining 5 injury diagnoses (29.4%) were sport-related injuries. Overall, muscle strain (n=4; 23.5%), neck strain (n=3; 17.6%), and back strain (n=2; 11.8%) were the most frequently reported acute injuries.

Muscle, back or neck strains were the most frequently diagnosed acute injuries during this rotation for both injury mechanisms reported (i.e., non-battle, non-sport and sport-related). Within the CAF demographic group, a total of 8 acute injuries were reported. Three of these (37.5%) were non-battle non-sport injuries, and 5 (62.5%) were sport-related injuries. Within the civilian demographic group, all 9 acute injuries reported (100.0%) were attributed to non-battle non-sport related causes (Table 6).

No acute injuries were reported by personnel in the "other" demographic group during this rotation.

Table 6. Distribution of Acute Injuries by Demographic Group - Op ADDENDA Roto 4*

DIAGNOSIS	INJURY MECHANISM					
	Non-Battle, Non-Sport Injuries		Sport Injuries		Total	
CAF PERSONNEL						
Muscle Strain (site unspecified)	1		3		4	
Back Strain	0		1		1	
Muscle Tear (site unspecified)	0		1		1	
Cervical Strain	1		0		1	
Superficial Injury (unspecified)	1		0		1	
Total	3	(37.5%)	5	(62.5%)	8	(100.0%)
CIVILIAN PERSONNEL						
Neck Strain	3		0		3	
Back Strain	2		0		2	
Dental Fracture	1		0		1	
Wrist Sprain	1		0		1	
Superficial Injury (unspecified)	1		0		1	
Muscle Strain (site unspecified)	1		0		1	
Total	9	(100%)	0	(0.0%)	9	(100%)

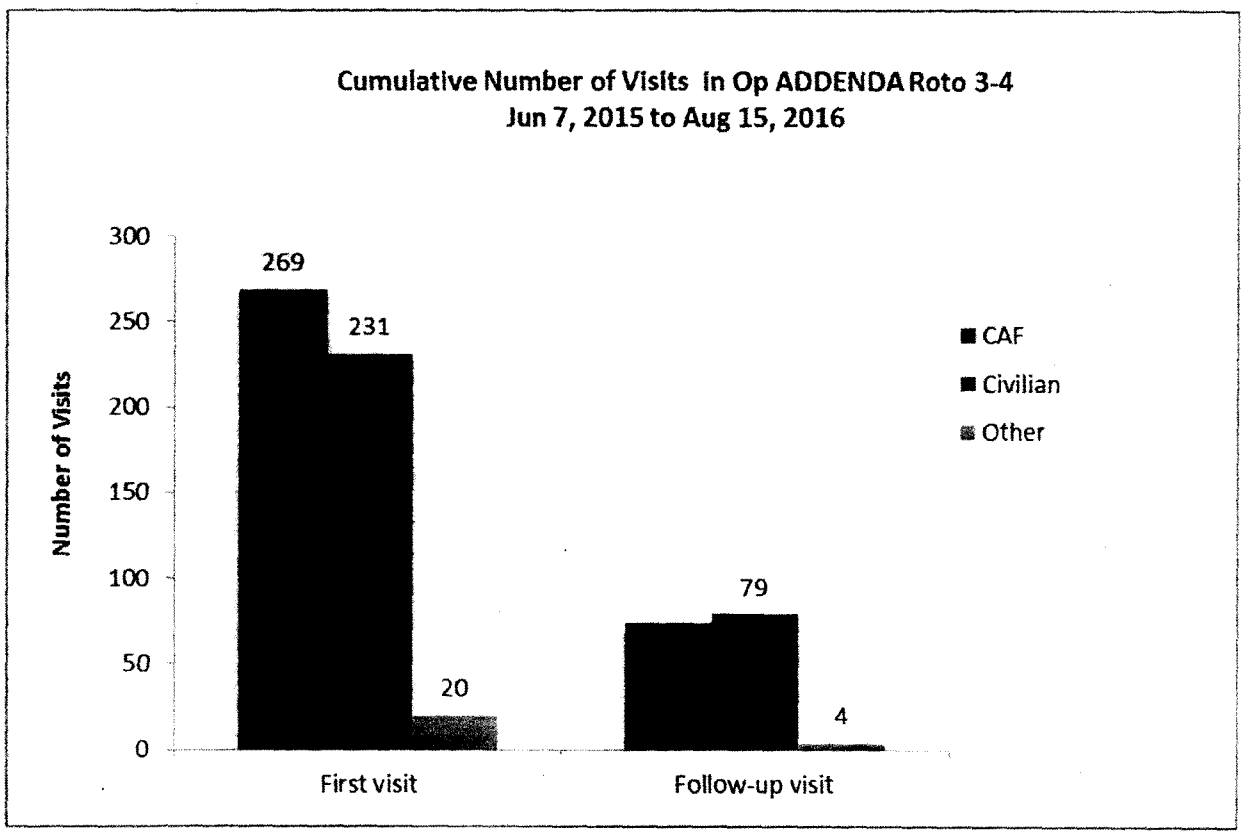
Disposition and Days Lost

Two light duty restrictions were granted to CAF personnel during first-time visits during this rotation (11 and 10 light duty days, respectively). Based on the assumption of a half day lost for each excused duty day granted, these restrictions resulted in a total of 10.5 days lost. Duty restrictions assigned during follow-up visits were not included in this total, as it was not possible to determine if they were newly assigned during the follow-up visit.

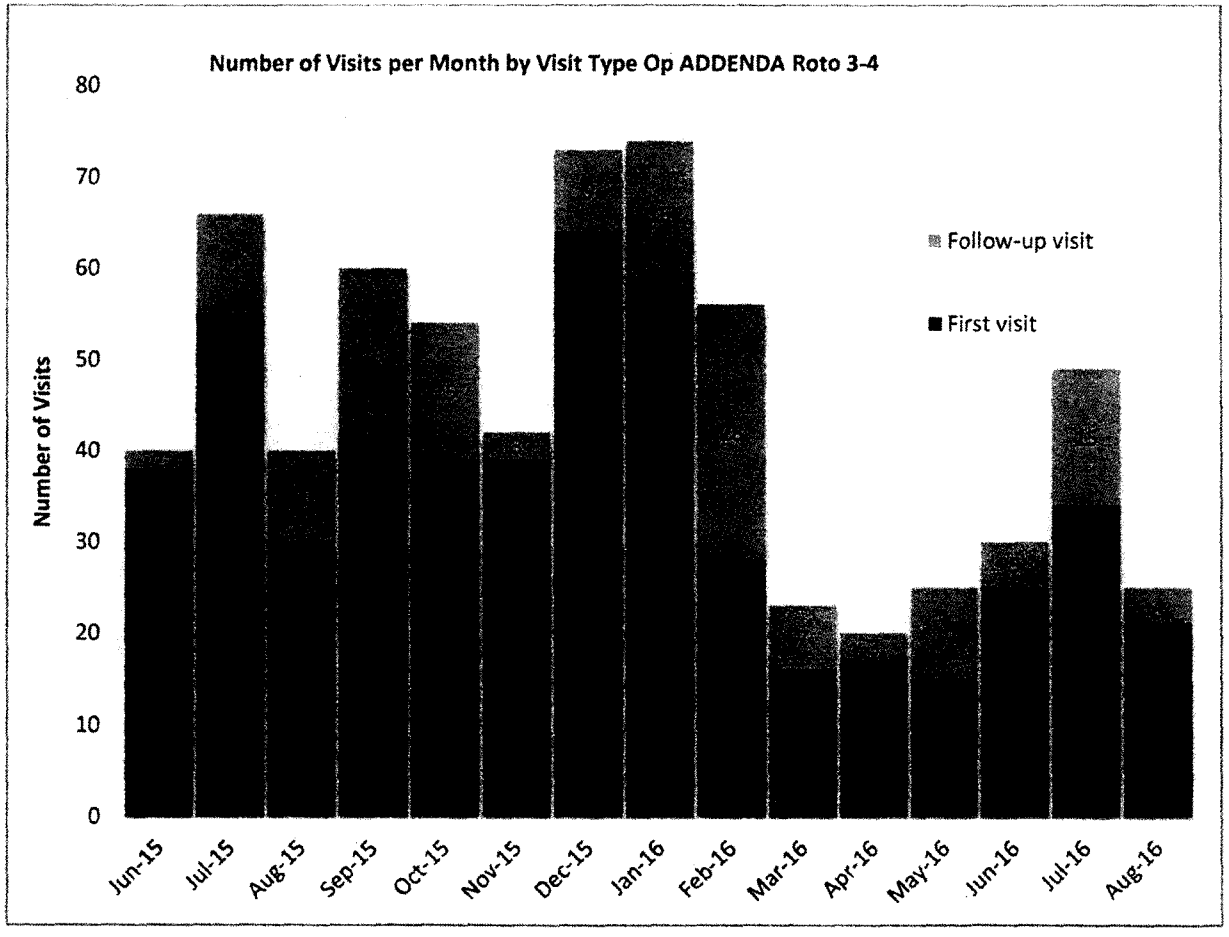
Annexes

Two additional graphs were included as annexes in this document. They display the cumulative information for Op Addenda from Jun 1st, 2015 (Roto 3) through to August 15, 2016 (Roto 4). All demographic groups are included in the information.

Annex 1. Cumulative number of visits by demographic group and visit type (Roto 3 and 4)



Annex 2. Cumulative number of visits per month by visit type, all demographic groups (Roto 3 and 4)



Disease and Injury Surveillance System (DISS) Op Addenda Summary Report for Roto 3

07 June 2015 to 31 December 2015

Prepared for: LCol Forestier
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DFHP Epidemiology section

29thth January 2016

Op ADDENDA Roto 3 Disease Injury Surveillance System Summary Report

EXECUTIVE SUMMARY

INTRODUCTION

This report is a summary of the main disease and injury findings reported in the Disease and Injury Surveillance System (DISS) by health personnel in Op ADDENDA Roto 3, between 07 June to 31st December 2015. Information presented includes the frequencies and distribution of first and follow up visits, primary diagnoses or reasons for visits, outbreak indicators, injuries, and types of injury mechanisms. This report also describes the number of excused-duty days, light-duty days, admissions, medical evacuations, and referrals to medical specialists that were granted during Roto 3, overall and broken down by primary diagnoses.

DISS data was collected for all individuals that were treated at the Kabul treatment facility during Roto 3 and includes Canadian Armed Forces (CAF) deployed personnel as part of Op ADDENDA, civilians from the Canadian Diplomatic Mission in Kabul (Afghanistan), and other personnel (civilians from other diplomatic allied countries and NGO's).

The DISS DWAN version was used to input the information. The information captured by the system was UNCLASSIFIED as it does not have personal identifiers for CAF personnel.

Limitations

Sex and age group information was available only for the civilian population. To avoid potential residual disclosure, this report only includes aggregated data. Also, results are provided by counts only as it was not possible to estimate the denominator for each demographic group. Due to this limitation, statistical tests were not computed to determine whether changes in disease frequency were statistically significant or due to random fluctuation. Consequently, disease trends presented in this report should be interpreted with caution.

SUMMARY FINDINGS

Overall Findings

Three hundred and seventy-five medical visits took place from 07 June to 31st December 2015 (average = 1.8 visits per day). When stratified by demographic group, 51.7% (n=194) of the total visits corresponded to civilian personnel, 43.5% (n=163) to CAF personnel, and 4.8% (n=18) to other.

For all demographic groups, upper respiratory tract infections (URTI) (n=49/306; 16.0%) was the main reason for first-time visits followed by immunizations (n=22/306; 7.2%), and headache (n= 19/306; 6.2%).

By ICD-10 categories, 20.3% (n=62) of first-time visits were related to diseases of the respiratory system, 13.1% (n=40) first-time visits were related to injuries, and 12.7% (n=39) first-time visits were related to musculoskeletal (MSK) conditions.

Findings by Demographic Group

Among CAF personnel, the most frequent primary diagnosis reported for first-time visits was URTI (19/143; 13.3%).

Within the civilian demographic group, males accounted for 66.5% (n=129) of all medical visits and females for 33.5% (n=65). Approximately half of all medical visits were for patients between the ages of 30 and 44 years (96/194; 49.5%). In the female group, (26/65; 40.0%) of all visits occurred in the 65 to 69 age group, whereas in the male group the most frequent number of visits occurred in the 30 to 34 age group (29/129; 22.5%) . Among both male and female civilians, the main primary diagnosis for first-time visits was unspecified URTI at 21.6% (n=24) and 18.9% (n=7), respectively.

For the other demographic group, headache 13.3% (n=2) was the main primary diagnosis for first-time visits.

Reportable Communicable Diseases and Outbreak Markers

During Roto 3, one case of pulmonary tuberculosis was identified as a notifiable communicable disease in the civilian demographic group.

No disease outbreaks were reported during this time period; however, a higher than average number of URTI outbreak marker indicators[1] were observed in the months of September (n=9), October (n=10) and December (n=19) compared to the monthly average of 7. Likewise, a higher than average number of GI outbreak marker indicators were observed in July (n=6) and September (n=9) compared to the monthly average of 2.6.

Acute Injury Incidence

There were 46 acute injuries reported during first-time visits. Of all acute injuries, 50.0% were non-battle non-sport related injuries and 50.0% percent were sports-related injuries. Almost 70.0% of all acute injuries corresponded to CAF personnel, 26.1% to civilians, and the remaining 4.3% to the other demographic group.

Abrasion (3/23; 13.0%) and first-degree burns (3/23; 13.0%) were the most frequent non-battle and non-sport acute injuries, whereas back pain (5/23; 21.7%), and neck strain (4/23; 17.4%) were the most frequent sports-related injuries.

[1] Outbreak marker indicators[1] are a set of conditions that have been grouped in five different categories to help identify potential outbreaks. Defined by DFHP as: Upper respiratory tract infection (URTI), Lower respiratory tract infection (LRTI), gastrointestinal illness (GI), fever (F), and climatic injuries (C).

Sports-related injuries accounted for 59.4% (19/32) of all newly diagnosed acute injuries in the CAF demographic group, whereas non-battle non-sport related injuries accounted for 75.0% (9/12) of all newly diagnosed acute injuries in the civilian demographic group.

Disposition and Days Lost

Only one duty restriction (one excused duty) was granted during Roto 3 for gastroenteritis.

COMPLETE REPORT

INTRODUCTION

This report is a summary of the main disease and injury findings reported in the Disease and Injury Surveillance System (DISS) between 07 June to 31st December 2015 by health personnel in Op ADDENDA Roto 3. Information presented includes the frequencies and distribution of first and follow up visits, primary diagnoses or reasons for visits, outbreak indicators, injuries, and types of injury mechanisms. This report also describes the number of excused-duty days, light-duty days, admissions, medical evacuations, and referrals to medical specialists that were granted during Roto 3, overall and broken down by primary diagnoses.

DISS data was collected for all individuals that were treated at the Kabul treatment facility during Roto 3 and includes Canadian Armed Forces (CAF) deployed personnel as part of Op ADDENDA, civilians from the Canadian Diplomatic Mission in Kabul (Afghanistan), and other personnel (civilians from other diplomatic allied countries and NGO's).

The DISS DWAN version was used to input the information. The information captured by the system was UNCLASSIFIED as it does not have personal identifiers for CAF personnel.

Limitations

Sex and age group information was available only for the civilian population. To avoid potential residual disclosure, this report only includes aggregated data. Also, results are provided by counts only as it was not possible to estimate the denominator for each demographic group. Due to this limitation, statistical tests were not computed to determine whether changes in disease frequency were statistically significant or due to random fluctuation. Consequently, disease trends presented in this report should be interpreted with caution.

OVERALL FINDINGS

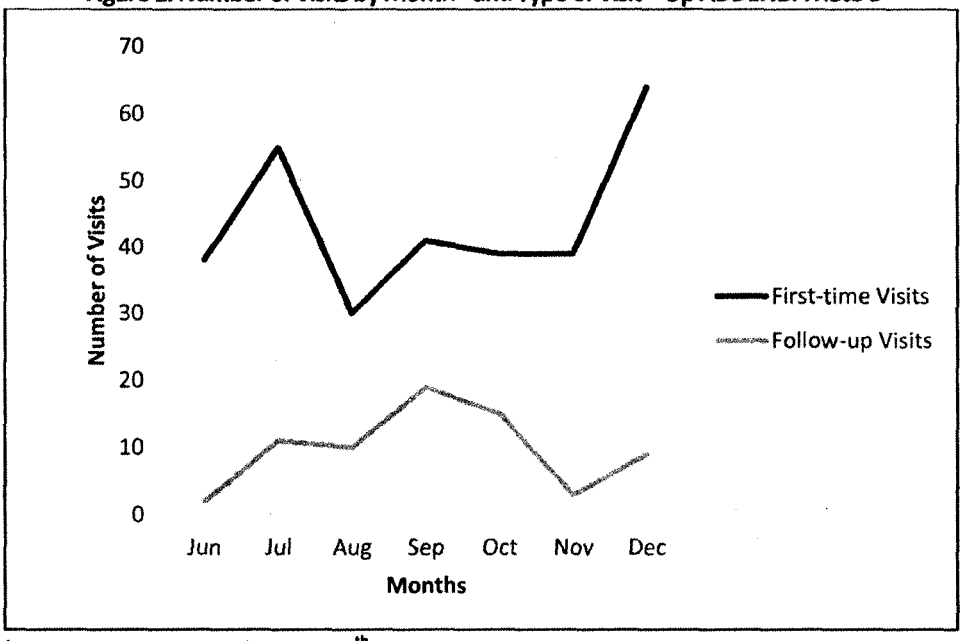
A total of 375 medical visits took place from June 07th to December 31st 2015 (average = 1.8 visits per day). One hundred and ninety-four of the visits (51.7%) corresponded to civilian personnel, 163 visits (43.5%) to CAF personnel, and 18 visits (4.8%) to the other demographic group. Three hundred and six visits (81.6%) corresponded to first-time visits and 69 (18.4%) to follow-up visits (Table 1).

Overall, the average number of visits per month was 53.6 visits (note-data was not collected for six days in June 2015). The number of first-time visits peaked during the month of December (n= 64) and the lowest number of visits occurred during the month of August (n=30). In contrast, the number of follow-up visits was highest during the month of September (n=19) and the lowest number was during the month of November[2] (Figure 1).

Table 1. Distribution of Visits by Demographic Groups and Visit Type- Op ADDENDA Roto 3

	Visit Type			
Demographic Group	First visit	Follow-up visit	Total	
Civilians	148	46	194	(43.5%)
CAF	143	20	163	(51.7%)
Other	15	3	18	(4.8%)
Total	306	69	375	(100.0%)

Figure 1. Number of Visits by Month* and Type of Visit – Op ADDENDA Roto 3



***Data collection started on June 7th, 2015**

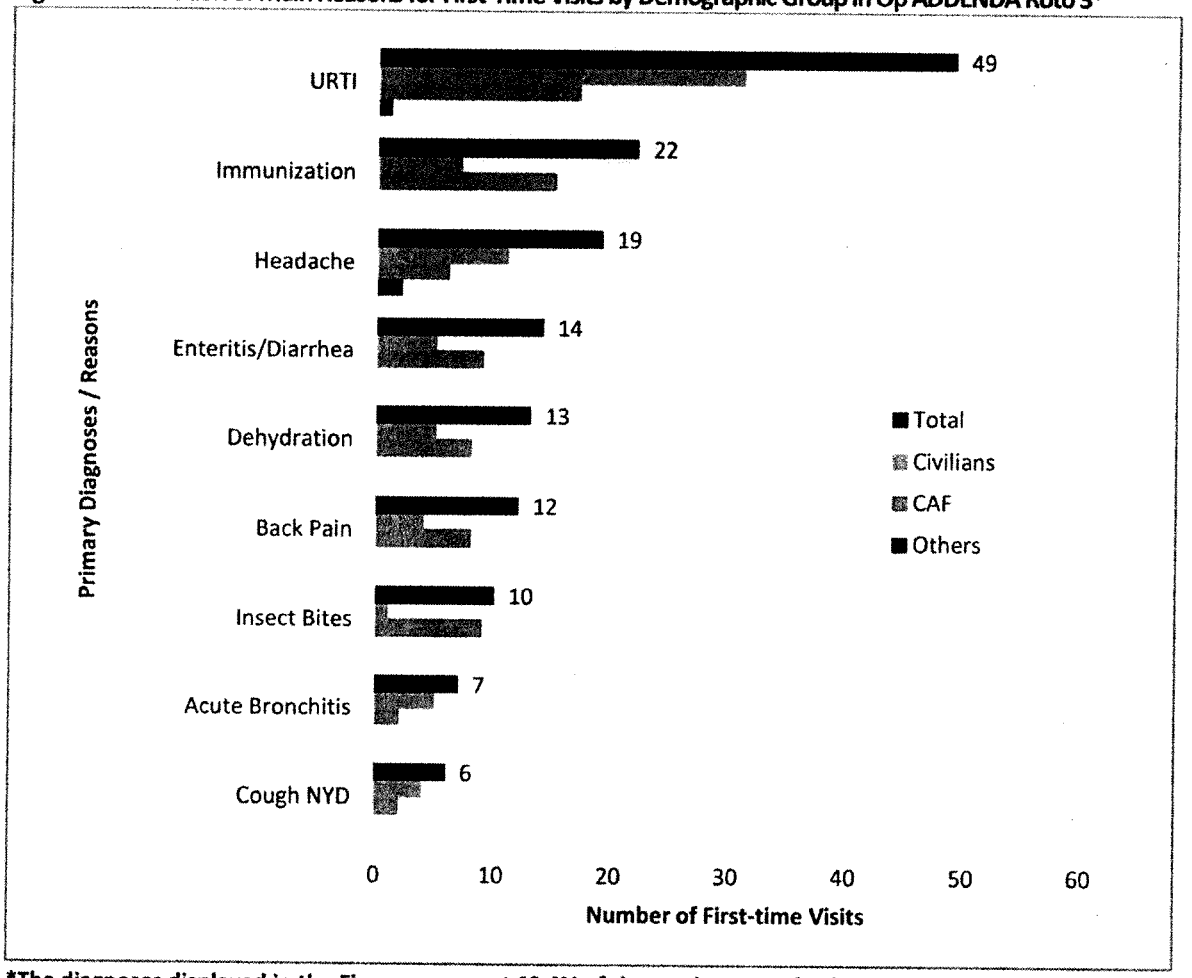
Description of First-time Visit Diagnoses

Almost fifty percent of first-time visits were related to nine diagnoses, as shown in figure 2. URTI (n=49/306; 16.0%) was the most frequent primary diagnoses for first-time visits, followed

[2] Although June had 2 follow-up visits they were not taken in consideration as the Operation started on June and very few or none follow-up visits were expected.

by immunizations reasons (n=22/306; 7.2%), and headache (n= 19/306; 6.2%). There were 88 other primary diagnoses that contributed five or fewer first-time visits each during Roto 3. Figure 2 displays the distribution of the 11 most frequent primary diagnoses.

Figure 2. Distribution of Main Reasons for First-Time Visits by Demographic Group in Op ADDENDA Roto 3*



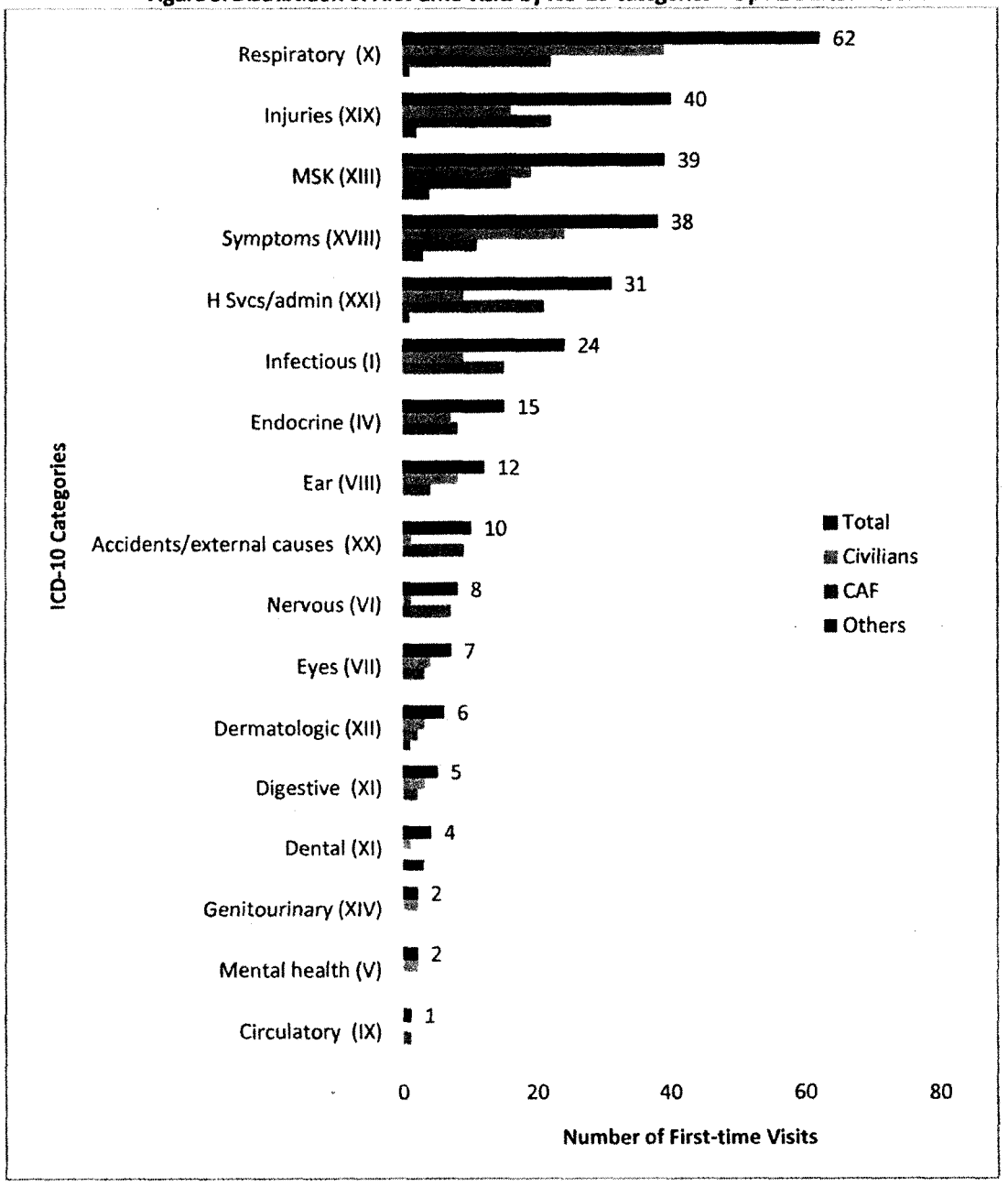
***The diagnoses displayed in the Figure represent 49.4% of the total reasons for first-time visits. The remaining 50.6% had 5 or less visits per diagnosis.**

When grouped by the five most frequent ICD-10 categories[3] (Figure 3) 62 first-time visits (20.3%) were related to diseases of the respiratory system (Category X), 40 first-time visits (13.1%) were related to injury, poisoning and certain other consequences of external causes (Category XIX), 39 first-time visits (12.7%) were related to diseases of the musculoskeletal system and connective tissue (Category XIII), 38 first-time visits (12.4%) were related to symptoms, signs and abnormal clinical/laboratory findings (Category XVIII), and 31 first-time

[3] International Classification of Diseases is the WHO diagnostic classification standard for all clinical and research purposes (including health surveillance).

visits (10.1%) related to factors influencing health status and contact with health service (Category XXI).

Figure 3. Distribution of First-time Visits by ICD-10 Categories – Op ADDENDA Roto 3



Description of First-time Visit Diagnoses by Demographic Group

CAF Demographic Group

The four main reasons for first-time visits among CAF personnel during Roto 3 were URTI (19/143; 13.3%), immunization visits (15/143; 10.5%), unspecified gastroenteritis (11/143; 7.7%), and back pain (11/143; 7.7%), as shown in Table 2.

Table 2. Distribution of First-time Visits by Diagnoses in the CAF Demographic Group- Op ADDENDA Roto 3

Diagnoses	First-time Visits	
	n	(%)
URTI*	19	(13.3%)
Immunization	15	(10.5%)
Gastroenteritis	11	(7.7%)
Back Pain**	11	(7.7%)
Insect Bites	9	(6.3%)
Dehydration	8	(5.6%)
Sleep Disorder***	7	(4.9%)
Headache	6	(4.2%)
Neck Strain	5	(3.5%)
Post Deployment Medical Exam	5	(3.5%)
Abrasion	3	(2.1%)
Dry Eyes	3	(2.1%)
LRTI****	3	(2.1%)
Burn, 1st Degree	2	(1.4%)
Ear Pain	2	(1.4%)
Herpes Simplex	2	(1.4%)
Muscle Strain	2	(1.4%)
Perforation Tympanic Membrane	2	(1.4%)
Others*****	28	(19.6%)
Total	143	(100.0%)

*** URTI includes URTI unspecified diagnoses and cough**
**** Back pain includes low back pain diagnoses**
***** Sleep disorder includes insomnia diagnoses**
****** LRTI includes influenza and acute bronchitis diagnoses**
*******Others include 28 different diagnoses that contributed 1 first-time visit only**

Civilian Demographic Group

Within the civilian[4] demographic group, 129 (66.5%) medical visits corresponded to males and 65 (33.5%) visits to females (Table 3). In relation to age groups, roughly half of all civilian medical visits (96/194; 49.5%) were for patients between 30 to 44 years of age for both sex groups combined. In the female group, the highest number of medical visits (26/65; 40.0%) occurred in the 65 to 69 age group, whereas in the male group the highest number of visits (29/129; 22.5%) corresponded to the 30 to 34 age group (Table 3). All patients seen during this time period were adults who were 20 years or older at the time of their visit.

Table 3. Distribution of Civilian Medical Visits by Sex and Age groups- Op ADDENDA Roto 3

	Sex		
Age Group	Female	Male	Total
20 to 24	1 (1.5%)	4 (3.1%)	5 (2.6%)
25 to 29	1 (1.5%)	19 (14.7%)	20 (10.3%)
30 to 34	5 (7.7%)	29 (22.5%)	34 (17.5%)
35 to 39	8 (12.3%)	28 (21.7%)	36 (18.6%)
40 to 44	6 (9.2%)	20 (15.5%)	26 (13.4%)
45 to 49	11 (16.9%)	10 (7.8%)	21 (10.8%)
50 to 54	4 (6.2%)	7 (5.4%)	11 (5.7%)
55 to 59	3 (4.6%)	8 (6.2%)	11 (5.7%)
60 to 64	0 (0.0%)	4 (3.1%)	4 (2.1%)
65 to 69	26 (40.0%)	0 (0.0%)	26 (13.4%)
Total	65 (100.0%)	129 (100.0%)	194 (100.0%)

Females accounted for 25.0% of all first-time visits and males for 75.0% in the civilian demographic group (Table 4). Overall, the four main reasons for first-time visits among civilians were URTI (31/148; 20.9%), headache (12/148; 8.1%), immunization (8/148; 5.4%), and gastroenteritis (7/148; 4.7%), as shown in Table 4.

The main two reasons for first-time visits among civilian females were URTI (7/37; 18.9%) and immunization visits (5/37; 13.5%). There were 19 other unique diagnoses that accounted for three or less first-time visits each during the seven month time period.

For civilian males, the top four reasons for first-time visits were URTI (24/111; 21.6%), headache (12/111; 10.8%), gastroenteritis (7/111; 6.3%), and back pain (5/111; 4.5%). There were 52 other unique diagnoses that accounted for four or less first-time visits each during Roto 3.

[4] Age groups and sex information was only captured for civilians.

Table 4. Distribution of First-time Visits by Diagnoses and Sex in the Civilian Demographic Group- Op ADDENDA Roto 3

Diagnoses	First-time Visits		
	Female	Male	Total
URTI	7	24	31 (20.9%)
Headache*	3	9	12 (8.1%)
Immunization**	5	3	8 (5.4%)
Gastroenteritis***	0	7	7 (4.7%)
Acute Bronchitis	3	2	5 (3.4%)
Dehydration	1	4	5 (3.4%)
Back Pain	0	5	5 (3.4%)
Allergy, Environmental	0	4	4 (2.7%)
Ankle Sprain	0	4	4 (2.7%)
Cough NYD	1	3	4 (2.7%)
Otitis Externa	2	2	4 (2.7%)
Limb Pain	0	3	3 (2.0%)
Conjunctivitis****	1	2	3 (2.0%)
Abdominal Pain	1	1	2 (1.4%)
Chest Pain (MSK Origin)	0	2	2 (1.4%)
Ear Wax Blockage	1	1	2 (1.4%)
Foot Pain, NYD	0	2	2 (1.4%)
Hypoglycemia	0	2	2 (1.4%)
Indigestion	0	2	2 (1.4%)
Head Laceration	0	2	2 (1.4%)
Laryngitis	1	1	2 (1.4%)
Torticollis	1	1	2 (1.4%)
Urinary Tract Infection	2	0	2 (1.4%)
Others*****	8	25	33 (22.3%)
Total	**37 (25.0%)**	**111 (75.0%)**	**148 (100.0%)**

***Headache includes cluster headache diagnoses**
****Immunization includes influenza vaccination**
*****Gastroenteritis includes viral gastroenteritis and vomiting diagnoses**
****** Conjunctivitis includes dry eyes**
*******Others include 33 different diagnoses that contributed a total of 1 first-time visit only**

Other Demographic Group

There were fifteen first-time visits by patients from the other demographic group. The two main reasons for first-time visits were headache (2/15; 13.3%) and knee pain (2/15; 13.3%). There were 13 other diagnoses reported that contributed only one first-time visit each during the reporting period.

Reportable Communicable Diseases and Outbreak Markers Indicators

One reportable communicable disease case of pulmonary tuberculosis was identified during this time-period. The case reported corresponded to a civilian.

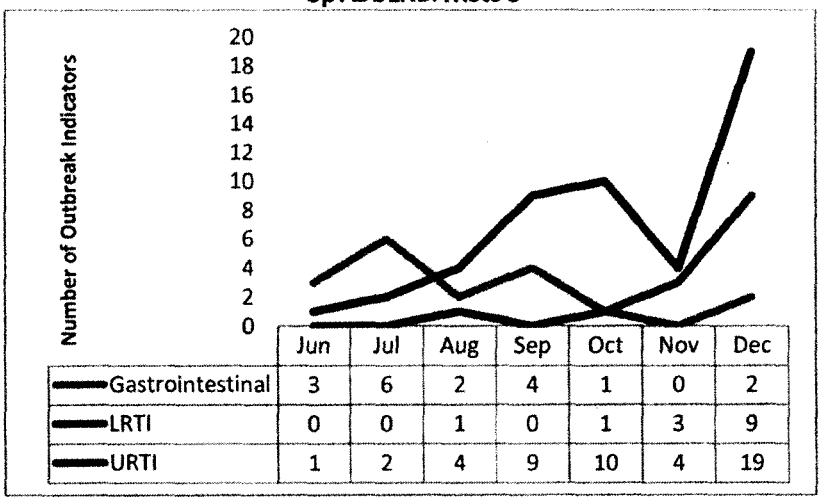
Outbreak marker indicators are a set of conditions that have been grouped in five different categories to help identify outbreaks when the numbers or rates surpass an expected value. Any observed changes do not take into account denominator data and were not tested for non-significance to determine if observed differences were due to random fluctuation. Therefore, statistical tests for trends could not be conducted to identify statistically significant changes over time.

In total there were 81 outbreak indicators reported between June 7th and December 31st, 2015. URTI outbreak indicators were the most frequently reported (49/81; 60.5%), followed by gastrointestinal (GI) (18/81; 22.2%), and lower respiratory tract infections (LRTI) (14/81; 17.3%) (Figure 4).

The number of URTI indicators per month varied from one in June (based on 24 observation days) to 19 in December. GI outbreak indicators ranged from zero in November to a high of six indicators in July. The frequency of LRTI cases was low for most of the reporting period (range = 0 - 3 indicators), except for the month of December when there were 9 indicators that accounted for 64.3% of all LRTI indicators identified during the observation period. No climatic or fever outbreak indicators were reported during the Roto 3 time period.

Increased counts of URTI in December are suggestive that infectious respiratory conditions may have been influenced by seasonal trends (increasing as the temperature decreases).

Figure 4. Number of Outbreak Indicators* by Month for all Demographic Groups – Op ADDENDA Roto 3**



	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Gastrointestinal	3	6	2	4	1	0	2
LRTI	0	0	1	0	1	3	9
URTI	1	2	4	9	10	4	19

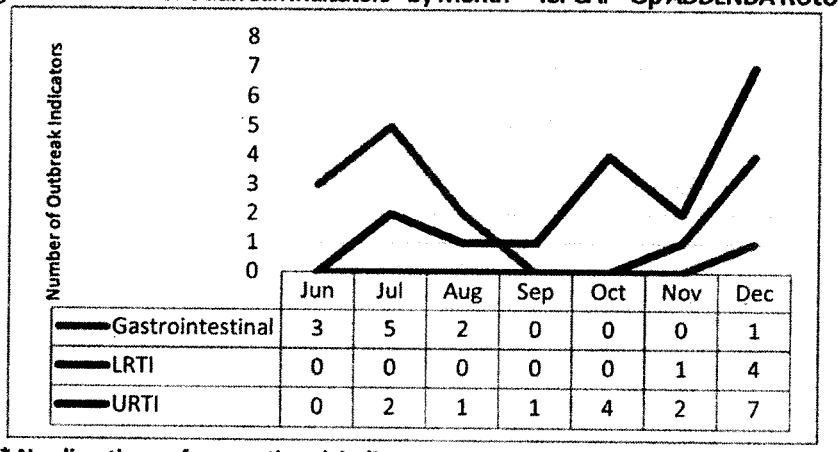
*** No climatic nor fever outbreak indicators were reported thus not included in the graph**

**** Data collection started on June 7th, 2015**

The graph in Figure 5 displays the patterns of outbreak indicators for the CAF demographic group. In total for CAF personnel there were 17 URTI outbreak marker indicators, 11 GI outbreak marker indicators, and 5 LRTI outbreak marker indicators reported during Roto 3. If the CAF population number remained constant (19 persons per month) then three important peaks are to be noted. GI outbreak marker peaked in July (n=5) suggesting that 26.3% of the CAF members in Kabul had a GI infection during this month.

As for URTI outbreak indicators, the number was highest in December (n=7) compared to the monthly average number of 2.4, suggesting that 36.8% of the CAF population had a URTI. Lastly, LRTI outbreak indicators were also highest in December (n=4) compared to the monthly average number of 0.7, suggesting that 21.1% of the CAF population were affected by a LRTI. Statistical tests were not performed to determine if these peaks in disease incidence were due to chance.

Figure 5. Number of Outbreak Indicators* by Month for CAF - Op ADDENDA Roto 3**

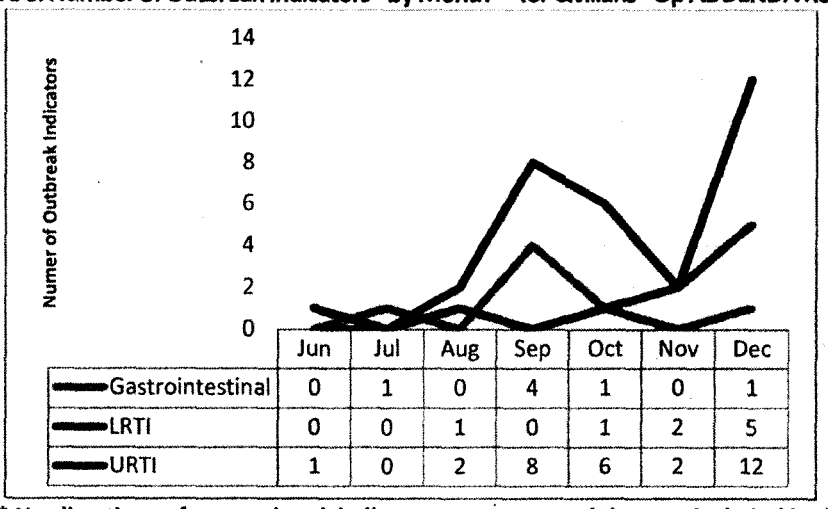


	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Gastrointestinal	3	5	2	0	0	0	1
LRTI	0	0	0	0	0	1	4
URTI	0	2	1	1	4	2	7

*** No climatic nor fever outbreak indicators were reported thus not include in the graph**
**** Data collection started on June 7th, 2015**

When stratifying by demographic groups, URTI outbreak indicators were predominantly identified in the civilian group (31/49; 63.3%). Figure 6 displays two potential peaks, one in September (n=8) and then the second and highest in December (n=12); however, statistical significance cannot be assessed to determine whether these increases may be due to chance.

Figure 6. Number of Outbreak Indicators* by Month for Civilians - Op ADDENDA Roto 3**



	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Gastrointestinal	0	1	0	4	1	0	1
LRTI	0	0	1	0	1	2	5
URTI	1	0	2	8	6	2	12

*** No climatic nor fever outbreak indicators were reported thus not included in the graph**
**** Data collection started on June 7th, 2015**

Acute Injury Incidence

Forty-six acute injuries accounted for 15.0% of all diagnoses during first-time visits (46/306) for all demographic groups combined. Twenty-three acute injuries (50.0%) were non-battle non-sport injuries and 23 (50.0%) were sport injuries (Table 5).

Overall, abrasion (10.9%), neck strain (10.9%), and back pain (10.9%) were the most frequently reported acute injuries, as shown in Table 5.

Thirty-two acute injuries (69.6%) corresponded to CAF personnel, 12 to civilians (26.1%) and two to the others demographic group (4.3%).

Within the CAF demographic group, 13 acute injuries (40.6%) were non-battle non sport injuries and 19 (59.4%) were sports-related. Neck strain (5/32; 15.6%) and back pain (5/32; 15.6%) were the most frequent diagnoses for acute injuries in this demographic group (Table 5).

Within the civilian demographic group, nine acute injuries (75.0%) were non-battle non-sport injuries and three (25.0%) were sports-related injuries. Ankle sprain (4/12; 33.3%) and head laceration (2/12; 16.7%) accounted for the most frequent diagnoses for acute injuries in this demographic group (Table 5).

The other demographic group contributed with two acute injuries, one diagnosed as an abrasion and the other one diagnosed as finger laceration (Table 5).

Table 5. Distribution of Acute Injuries by Diagnosis, Injury Mechanism and Demographic Group – Op ADDENDA Roto 3

Diagnoses	Injury Mechanism					
	Non-battle Non-sport Injuries		Sport Injuries		Total	
CAF						
Neck Strain	1		4		5	(15.6%)
Back Pain	0		5		5	(15.6%)
Abrasion	2		1		3	(9.4%)
Burn, 1st Degree	2		0		2	(6.3%)
Ear Pain	2		0		2	(6.3%)
Muscle Strain	1		1		2	(6.3%)
Knee Abrasion	0		1		1	(3.1%)
Biceps Tendonitis	0		1		1	(3.1%)
Blisters	0		1		1	(3.1%)
Dental Fracture	1		0		1	(3.1%)
Foot Contusion	0		1		1	(3.1%)
Head Injury Unspecified	1		0		1	(3.1%)
Lower Leg Laceration	0		1		1	(3.1%)
Neck Pain	0		1		1	(3.1%)
Perforation Tympanic Membrane	2		0		2	(6.3%)
Shoulder Muscle Strain	0		1		1	(3.1%)
Shoulder Pain	0		1		1	(3.1%)
Hand Splinter	1		0		1	(3.1%)
Total	**13**	(40.6%)	**19**	(59.4%)	**32**	(100.0%)
CIVILIANS						
Ankle Sprain	2		2		4	(33.3%)
Head Laceration	2		0		2	(16.7%)
Abrasion	1		0		1	(8.3%)
Burn, 1st Degree	1		0		1	(8.3%)
Dental Fracture	1		0		1	(8.3%)
Foreign Body Foot	1		0		1	(8.3%)
Lower Leg Laceration	0		1		1	(8.3%)
Muscle Strain	1		0		1	(8.3%)
Total	**9**	(75.0%)	**3**	(25.0%)	**12**	(100.0%)
OTHER						
Abrasion	0		1		1	(50.0%)
Finger Laceration	1		0		1	(50.0%)
Total	**1**	(50.0%)	**1**	(50.0%)	**2**	(100.0%)
GRAND TOTAL	**23**	(50.0%)	**23**	(50.0%)	**46**	(100.0%)

Disposition and Days Lost

One excused-duty day was granted to a CAF member because of gastroenteritis. No other dispositions were reported during Roto 3. Duty restrictions assigned during follow-up visits were not included in the totals presented in this report as it was not possible to determine if they were newly assigned during the follow-up visit.

Deployment Health Surveillance in Action: 18 months of Data from the Canadian Armed Forces Field Hospital in Kabul, Afghanistan

Commented [v1]: Not sure if this term is appropriate. "Field Hospital" to my knowledge has a specific connotation. I would double check with Maj Keddy

Introduction/Purpose: This study provides a unique overview of a year and a half worth of health surveillance efforts from Operation ADDENDA in Kabul, Afghanistan. This ongoing operation facilitates the day-to-day activities of the Canadian embassy, and the Role 1 health facility at this location serves almost equal numbers of both military and civilian personnel. The information presented in the report details the findings captured by the CAF deployment health surveillance system, and provides an update of the utility of the DISS in a long-term deployment context.

Methods: The Disease and Injury Surveillance System (DISS) is an automated electronic coding system that captures health information on medical visits in deployed settings. In addition to meeting Epi-NATO reporting standards, the DISS collects information on primary diagnoses, as well as injury mechanisms and outbreak markers. The data extracted for this report covered the surveillance period of 07 June 2015 to 31 Jan 2017. Frequencies and distributions of primary diagnoses, injuries, and specialist referrals were calculated based on the total number of medical visits. Special focus is given to period trends of key outbreak indicators (i.e., upper respiratory tract infections, lower respiratory tract infections, gastrointestinal, climactic and fever indicators). All analyses were performed in STATA 14.0 and Microsoft Excel 2010.

Results: A total of 846 medical encounters occurred over this 18-month period, corresponding to 413 visits (48.8%) by CAF personnel, 406 civilian visits (48.0%), and 27 visits (3.2%) by other military personnel. The majority of civilians treated during this period were male (66.5%). The primary reasons for medical visits included vaccinations (n=120), upper respiratory tract infections (n=87),) and administrative visits (n=53). The distribution of all diagnoses by ICD-10 category is provided. Within CAF personnel, 76 sport and non-battle non-sport related injuries were reported. In addition, a total of 10 specialist referrals were made and a minimum of 11.5 days of duty were lost. A breakdown of the 61 outbreak indicators reported during this period are presented by month to illustrate seasonal trends.

Conclusions: The ongoing deployment health surveillance efforts in Kabul, Afghanistan using the DISS have allowed for the capture of a comprehensive range of health conditions and operational impacts. This information can be used to facilitate resource planning, track outbreaks and quantify the burden of disease arising from a given mission. Future linkage with reliable denominator data could strengthen the utility of this data and its potential applications.

Data source: DISS Jan 2010 to Dec 2010

Sites included: Kaf 1, Prt_cns, FOB Mas'um Ghar, FOB Sperwan Ghar, Kabul Det, COP shoja, sp_folad, Op Khyber, FOB Zangabad, Op Cliff, Phoenix, Souter, Dubbs

Diagnosis	Specialist Referral	Admitted	Duty restrictions	Evacuated	Return to Active Duty	Total
Adjustment Disorder	No	0	5	0	57	62
	Yes	0	0	0	1	1
Anxiety	No	0	12	3	104	119
	Yes	0	0	0	5	5
Combat Stress Reaction	No	0	2	0	3	5
Depression	No	0	3	1	39	43
Grief Reaction	No	0	1	0	10	11
	Yes	0	0	0	1	1
Neurasthenia	No	0	0	0	1	1
Nightmares	No	0	0	0	5	5
	Yes	0	0	0	1	1
Obsessive Compulsive Neurosis	No	0	0	0	1	1
	Yes	0	0	0	1	1
Obsessive Compulsive Personality	No	0	0	0	1	1
Panic Attacks	No	0	0	0	7	7
Phobia	No	0	0	0	5	5
PTSD	No	0	0	0	17	17
Situational Crisis	No	0	1	0	9	10
	Yes	0	0	0	1	1
Somatization Disorder	No	0	0	0	5	5
Stress Reaction	No	0	3	0	32	35
	Yes	0	0	0	2	2
Insomnia	No	0	6	0	465	471
	Yes	0	0	1	1	2
Sleep Disorder	No	0	4	0	154	158
Suicidal Ideation	No	0	1	0	2	3
	Yes	0	1	1	0	2
Mental health visit	No	0	8	0	1098	1106
	Yes	0	0	0	2	2
Total		**0**	**47**	**6**	**2030**	**2083**

Orr LCdr SMA@CMP CF H SVCS Gp@Ottawa-Hull

From: Valbuena L@CMP DFHP@Ottawa-Hull
Sent: November-16-16 1:52 PM
To: Carew M@CMP DFHP@Ottawa-Hull; Dubiniecki C@CMP DFHP@Ottawa-Hull
Subject: FW: For Action: Mental health and deployment
Attachments: Ad-hoc- Afghanistan 2010-2011.docx

Importance: High

Hi Maureen,

Attached is the information requested from the data source available from Jan 2010 to Dec 2011. Other data sources issues are explained below.

We can discuss further.

Luisa

From: Valbuena L@CMP DFHP@Ottawa-Hull
Sent: November-16-16 12:25 PM
To: Dubiniecki C@CMP DFHP@Ottawa-Hull; Carew M@CMP DFHP@Ottawa-Hull
Subject: RE: For Action: Mental health and deployment
Importance: High

Hi Maureen and Christine,

A clarification to the email below in relation to the data sources:

1. No EpiNATO data available from 2001 to 2002
2. EpiNATO data from 2003 to 2009, as explained by Christine below
3. The DISS was rolled out in Afghanistan (2010 and 2011) and used at:

kaf 1
prt_cns
FOB Mas 'um Ghar
FOB Sperwan Ghar
kabul Det
COP shoja
sp_folad
Op Khyber
FOB Zangabad
op_cliff
Phoenix
Souter
Dubbs

4. The DISS started to be used in Op Addenda only in Kandahar in June 2015

For the purpose of answering the ad-hoc , the only reliable and available source is the DISS data Jan 2010 to Dec 2011.

Luisa

From: Dubiniecki C@CMP DFHP@Ottawa-Hull
Sent: November-16-16 12:14 PM
To: Carew M@CMP DFHP@Ottawa-Hull; Valbuena L@CMP DFHP@Ottawa-Hull
Subject: RE: For Action: Mental health and deployment

Hi Maureen –

I took a look at the EPINATO historical data for Afghanistan between 2001-2009and found that it did not include information on evacuations and only included the following dispositions.

First Attendance Visits	Subsequent Attendance Visits	Special Consultation	Return to Duty	Light Duty Days	Excused Duty Days	Admission\Bedded Down	Deaths

Unfortunately, we only have collated data on diagnosis and injury mechanism, so we cannot easily determine the number of MH dx during this period as it would involve going through multiple weekly reports and would take too much time. It took Luisa many months just to collate the diagnosis and injury mechanism data. Also, some of the information from this period is unavailable and/or difficult to locate.

In 2010, the DISS was implemented in Op Addenda (Kandahar), so both Luisa and I searched the master file and we found 6 mental health cases that resulted in an evacuation and 13 cases that resulted in a referral to a specialist:

Evacuation

2010 – 1 suicidal ideation, 2 anxiety
2011- 1 insomnia, 1 depression, and 1 anxiety

Referral to specialist
2010 – 2 anxiety, 1 grief reaction
2011 – 4 anxiety, 1 nightmares, 2 stress reaction, 1 obsessive compulsive neurosis, 1 situational crisis, 1 adjustment reaction

The implementation of the DISS has allowed for the collection of this type of detailed information, so going forward we will be able to provide answers to these questions more readily and accurately.

Please let me know if you have any other questions.

Christine

From: Carew M@CMP DFHP@Ottawa-Hull
Sent: November-16-16 10:15 AM
To: Dubiniecki C@CMP DFHP@Ottawa-Hull; Valbuena L@CMP DFHP@Ottawa-Hull
Subject: For Action: Mental health and deployment
Importance: High

Hi Luisa and Christine

Col Malcolm just stopped by and asked if you could look at Epi NATO data and see the number of personnel deployed to Afghanistan between October 2001 and March 2014 who were repatriated, seen and returned to theatre or referred to a specialist for mental health reasons. I 'm not sure if this info is available in Epi NATO?

The Surg Gen has requested this information as part of the response to the concerns around mefloquine and mental health.

Thanks
Maureen

Maureen Carew MD, MSc, FRCPC
Force Health Protection, CF Health Svcs Group
Department of National Defence
1745 Alta Vista Drive, Ottawa K1A 0K6
Tel: 613-945-6600 ext 3984
BB: 613-404-6815
Email: Maureen.Carew@forces.gc.ca

Data source: DISS Jan 2010 to Dec 2010

Sites included: Kaf 1, Prt_cns, FOB Mas'um Ghar, FOB Sperwan Ghar, Kabul Det, COP shoja, sp_folad, Op Khyber, FOB Zangabad, Op Cliff, Phoenix, Souter, Dubbs

Diagnosis	Specialist Referral	Admitted	Duty restrictions	Evacuated	Return to Active Duty	Total
Adjustment Disorder	No	0	5	0	57	62
	Yes	0	0	0	1	1
Anxiety	No	0	12	3	104	119
	Yes	0	0	0	5	5
Combat Stress Reaction	No	0	2	0	3	5
Depression	No	0	3	1	39	43
Grief Reaction	No	0	1	0	10	11
	Yes	0	0	0	1	1
Neurasthenia	No	0	0	0	1	1
Nightmares	No	0	0	0	5	5
	Yes	0	0	0	1	1
Obsessive Compulsive Neurosis	No	0	0	0	1	1
	Yes	0	0	0	1	1
Obsessive Compulsive Personality	No	0	0	0	1	1
Panic Attacks	No	0	0	0	7	7
Phobia	No	0	0	0	5	5
PTSD	No	0	0	0	17	17
Situational Crisis	No	0	1	0	9	10
	Yes	0	0	0	1	1
Somatization Disorder	No	0	0	0	5	5
Stress Reaction	No	0	3	0	32	35
	Yes	0	0	0	2	2
Insomnia	No	0	6	0	465	471
	Yes	0	0	1	1	2
Sleep Disorder	No	0	4	0	154	158
Suicidal Ideation	No	0	1	0	2	3
	Yes	0	1	1	0	2
Mental health visit	No	0	8	0	1098	1106
	Yes	0	0	0	2	2
Total		**0**	**47**	**6**	**2030**	**2083**

Ad-hoc Request Response

Date Requested: 24-November-2016
Date Delivered: 11-Jan-2017
Timeline: January 13-2017.

Requested by: Col Malcolm, Director Force Health Protection
Prepared by: Luisa Valbuena
Reviewed by: Dr. Maureen Carew, Christine Dubiniecki

Request: All mental health (MH) related conditions captured through the Disease and Injury Surveillance System (DISS), CAF personnel only.

1. Total number of mental health conditions and distribution by diagnosis type, first-time visits, follow-up visits, types of disposition, and total number of total days lost.
2. For Afghanistan 2010-2011
3. For Op Impact (comparison purpose)
4. For Op Reassurance LTF (comparison purpose)

Only tables and graphs are required, no written document.

Data Sources and Search Criteria:

The Operations included in this report were:

Operation	Site	Period	Data Source	Denominator Data Source
Afghanistan	Afghanistan	Jan 2010 to Dec 2011 (2 year period)	DISS V1[1]	Afghanistan Casualty Database (ACD)* 2005-2012
Impact	Kuwait	Jan 2015 to Dec 2015 (1 year period)	DISS V3[2]	CFTPO- DISS annual report 2015
Reassurance LTF	Lithuania Poland	Jan 2015 to Dec 2015 (1 year period)	DISS V3	CFTPO- DISS annual report 2015

***Note: The Afghanistan Casualty Database (ACD) has not been validated. When combining two different data sources (ACD and DISS) results may be odd however general proportions may still hold.**

[1] Disease and Injury Surveillance System version 1, rolled out in 2010
[2] Disease and Injury Surveillance System version 3, rolled out in 2014

In Afghanistan, malaria chemoprophylaxis was prescribed only to personnel deployed to specific risk areas during the seasonal period between May and November in 2010 and 2011.

The search criteria for the ad-hoc requests included all possible ICD-10 codes related to any type of mental health conditions. Final ICD-10 codes included in the report (F, G, and Z) are described in Annex 1.

Overall findings:

Table 1. Monthly Average Denominators by Operation by Year

	Afghanistan-2010[3]	Afghanistan-2011[3]	Op Impact-2015[4]	Op Reassurance LTF - 2015[4]
Jan	3736	3525	548	92
Feb	3750	3465	556	81
Mar	3757	3425	534	198
Apr	3867	3402	580	211
May	3925*	3235	561	202
Jun	3982	3123	556	196
Jul	3948	2600	550	273
Aug	3865	58***	557	223
Sep	3979	23	550	224
Oct	3914	17	611	224
Nov	3766**	7	562	222
Dec	3618	6	585	214

* Due to fluctuating numbers due to personnel rotation, the denominator for May is the estimated average from April and June, 2010.

** Due to fluctuating numbers due to personnel rotation, the denominator for November is the estimated average from October and December, 2010.

*** The population decreased substantially due to the withdrawal for troops which started in August.

Table 2. Total Number of Mental Health Related First-time Visits by Operation and Year

Year	Afghanistan	Op Impact	Op Reassurance LTF
2010	859	*	*
2011	943	*	*
2015	*	88	11
Total	**1802**	**88**	**11**

* No data captured.

[3] Afghanistan Casualty Database 2005-2012
[4] CFTPO- DISS annual 2015 denominators

AFGHANISTAN 2010-2011

Table 3. Total Number of Health Care Related Visits by Year and Visit Type - Afghanistan Jan 2010 to Dec 2011

Year	First-time Visit	Follow-up Visit	Total
2010	14247	2661	16908
2011	12194	1379	13573
Total	**26441**	**4040**	**30481**

Table 4. Total Number of Mental Health Related Visits by Year and Visit Type - Afghanistan Jan 2010 to Dec 2011

Year	First-time Visit	Follow-up Visit	Total
2010	859	212	1071
2011	943	79	1022
Total	**1802**	**291**	**2093**

Table 5. Number of Malaria Chemoprophylaxis Prescriptions during First-time Visits by year- Afghanistan Jan 2010 to Dec 2011

Year	Malaria Chemoprophylaxis
2010	57
2011	506
Total	**563**

Table 6. Number of Malaria Cases reported by year- Afghanistan Jan 2010 to Dec 2011

Year	Malaria Cases
2010	4
2011	3
Total	**7**

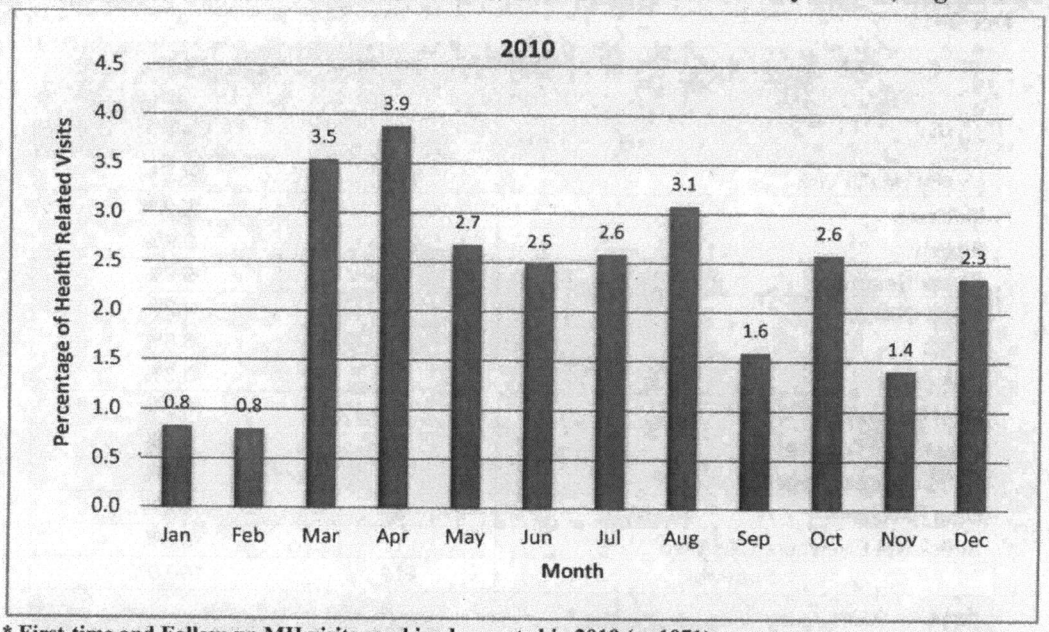
Table 7. Number of First-time Visits by Mental Health Related Diagnosis and Year – Afghanistan, Jan 2010 to Dec 2011

Diagnoses	First-time Visits	
2010	**(n)**	**(%)**
Mental Health Visit (dx unspecified)	421	49.0%
Insomnia	151	17.6%
Sleep Disorder	110	12.8%
Stress Not Elsewhere Classified	52	6.1%
Anxiety	47	5.5%
Adjustment Disorder	25	2.9%
Stress Reaction	16	1.9%
Depression	14	1.6%
PTSD	6	0.7%
Situational Crisis	5	0.6%
Grief Reaction	4	0.5%
Combat Stress Reaction	2	0.2%
Panic Attacks	2	0.2%
Phobia	1	0.1%
Neurasthenia	1	0.1%
Drug Psychosis	1	0.1%
Social Adjustment Problems	1	0.1%
Subtotal	***859***	***100.0%***
2011		
Mental Health Visit (dx unspecified)	539	57.2%
Insomnia	244	25.9%
Anxiety	45	4.8%
Sleep Disorder	38	4.0%
Adjustment Disorder	31	3.3%
Depression	12	1.3%
Situational Crisis	6	0.6%
Somatization Disorder	5	0.5%
Panic Attacks	5	0.5%
Nightmares	4	0.4%
Acute Stress Reaction	3	0.3%
Phobia	3	0.3%
Stress Reaction	2	0.2%
PTSD	2	0.2%
Social Adjustment Problems	1	0.1%
Obsessive Compulsive Neurosis	1	0.1%
Claustrophobia	1	0.1%
Fear of Flying	1	0.1%
Subtotal	***943***	***100.0%***
Total	**1802**	**(100.0%)**

Table 8. Follow-up Visits by Mental Health Related Diagnosis and Year – Afghanistan, Jan 2010 to Dec 2011

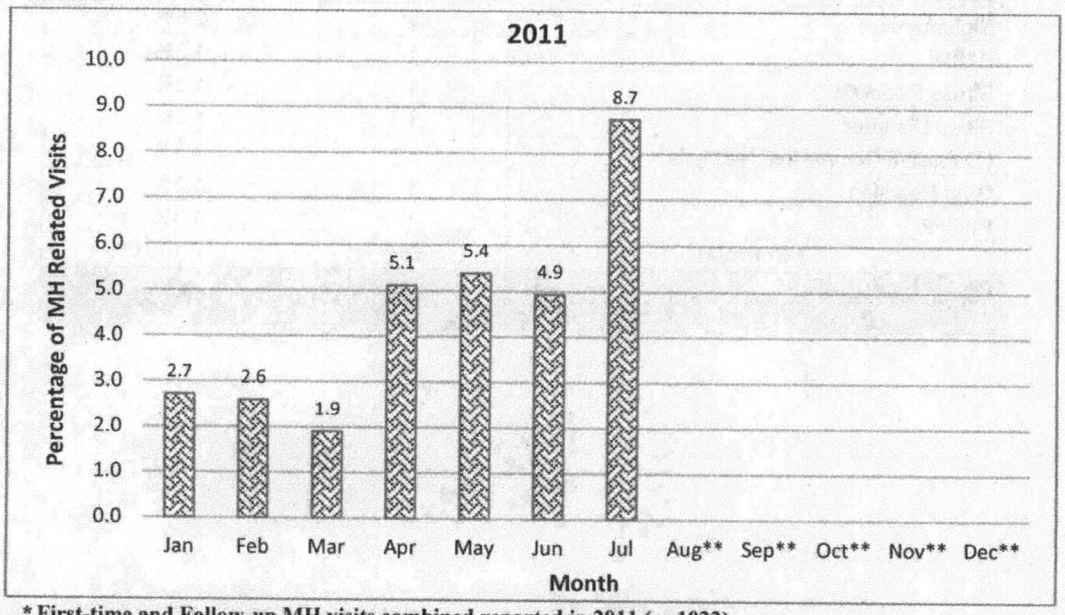
Diagnoses	Follow-Up Visits	
2010	**(n)**	**(%)**
Mental Health Visit	116	54.7%
Insomnia	22	10.4%
Anxiety	21	9.9%
Stress Reaction	12	5.7%
Sleep Disorder	9	4.2%
PTSD	8	3.8%
Depression	7	3.3%
Grief Reaction	7	3.3%
Adjustment Disorder	3	1.4%
Combat Stress Reaction	3	1.4%
Drug Psychosis	3	1.4%
Stress Not Elsewhere Classified	1	0.5%
Subtotal	*212*	*100.0%*
2011		
Mental Health Visit	32	40.5%
Insomnia	26	32.9%
Anxiety	9	11.4%
Adjustment Disorder	2	2.5%
Depression	2	2.5%
Nightmares	2	2.5%
PTSD	1	1.3%
Stress Reaction	1	1.3%
Sleep Disorder	1	1.3%
Obsessive Compulsive Neurosis	1	1.3%
Grief Reaction	1	1.3%
Phobia	1	1.3%
Subtotal	*79*	*100.0%*
Total	**291**	**100.0%**

Figure 1. Percentage of All Mental Health (MH) Related Visits in 2010 by Month, Afghanistan*†



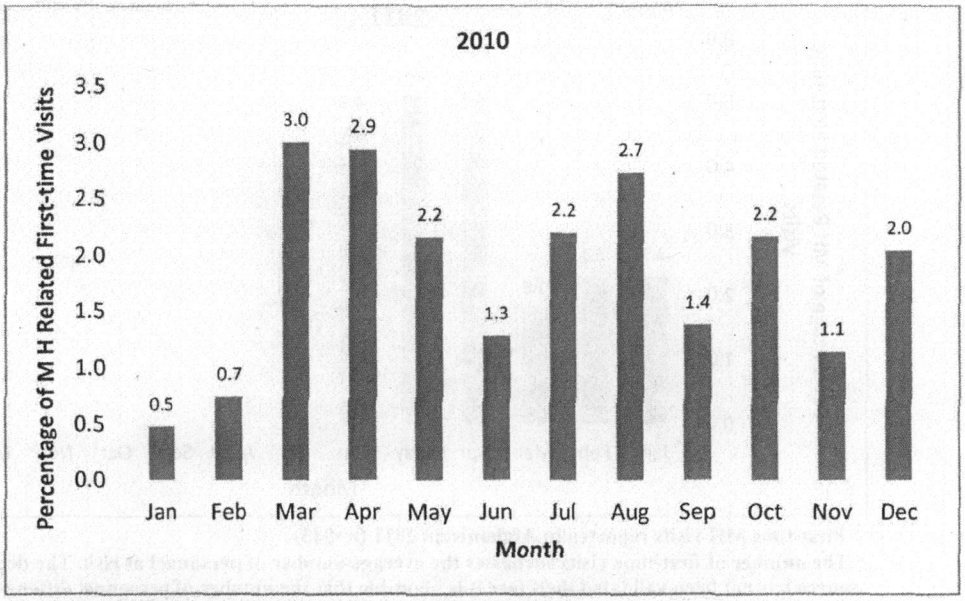
* First-time and Follow-up MH visits combined reported in 2010 (n=1071)
† Percentages based on ACD denominators

Figure 2. Percentage of All Mental Health (MH) Related Visits in 2011 by Month, Afghanistan 2011*



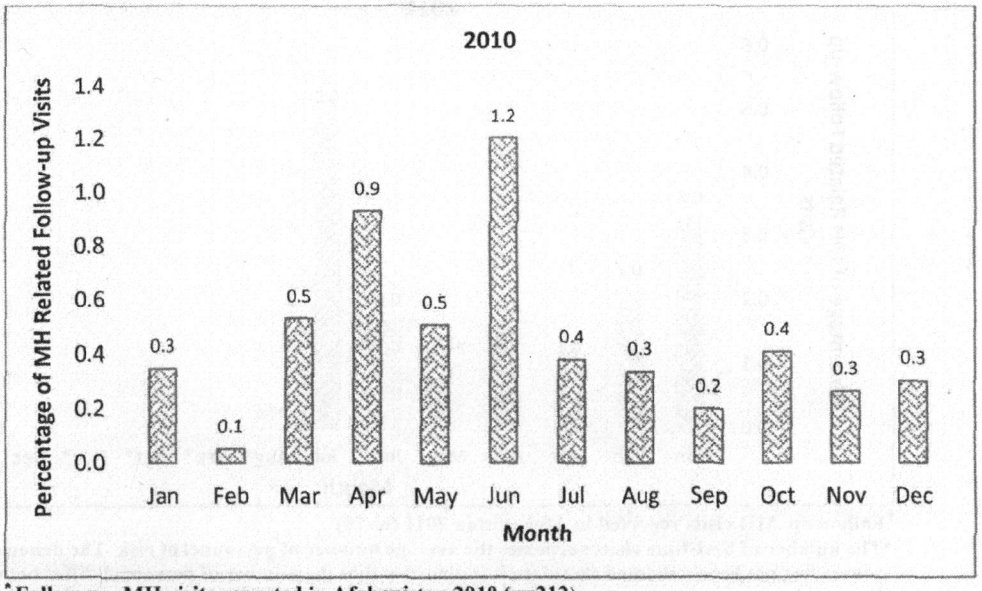
* First-time and Follow-up MH visits combined reported in 2011 (n=1022)
** The number of first-time visits surpasses the average number of personnel at risk. The denominator data source has not been validated therefore it is plausible that the number of personnel differ between data sets. Data omitted to avoid misinterpretation

Figure 3. Percentage of All First-Time Mental Health (MH) Related Visits in 2010 by Month, Afghanistan*



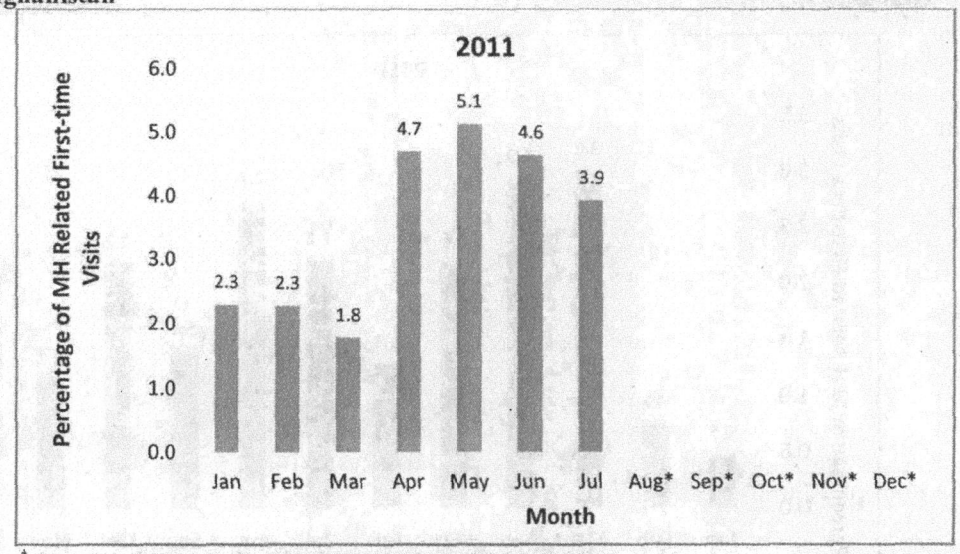
* First-time MH visits reported in Afghanistan 2011 (n=859)

Figure 4. Percentage of All Follow-Up Mental Health (MH) Related Visits in 2010 by Month, Afghanistan*



*Follow-up MH visits reported in Afghanistan 2010 (n=212)

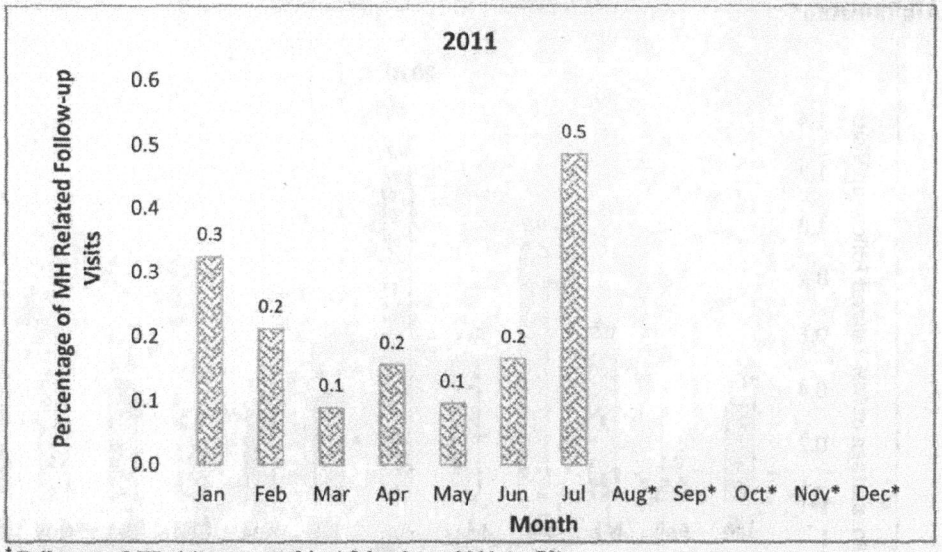
Figure 5. Percentage of All First-Time Mental Health (MH) Related Visits in 2011 by Month, Afghanistan†



† First-time MH visits reported in Afghanistan 2011 (n=943)

* The number of first-time visits surpasses the average number of personnel at risk. The denominator data source has not been validated therefore it is plausible that the number of personnel differ between data sets. Data omitted to avoid misinterpretation

Figure 6. Percentage of Mental Health (MH) Related Follow-up Visits by Month, Afghanistan 2011†



† Follow-up MH visits reported in Afghanistan 2011 (n=79)

*The number of first-time visits surpasses the average number of personnel at risk. The denominator data source has not been validated therefore it is plausible that the number of personnel differ between data sets. Data omitted to avoid misinterpretation

Table 9. Number of Mental Health Related Visits by Visit Type, Month and Year - Afghanistan Jan 2010 to Dec 2011

		Year		
Visit Type	**Month**	**2010**	**2011**	**Total**
First-time Visit	Jan	18	81	99
	Feb	28	79	107
	Mar	113	61	174
	Apr	114	160	274
	May	85	166	251
	Jun	51	145	196
	Jul	87	102	189
	Aug	106	43	149
	Sep	55	49	104
	Oct	85	42	127
	Nov	43	15	58
	Dec	74	0	74
Subtotal		*859*	*943*	*1802*
Follow-up Visit	Jan	13	11	24
	Feb	2	7	9
	Mar	20	3	23
	Apr	36	5	41
	May	20	3	23
	Jun	48	5	53
	Jul	15	6	21
	Aug	13	11	24
	Sep	8	6	14
	Oct	16	18	34
	Nov	10	4	14
	Dec	11	0	11
Subtotal		*212*	*79*	*291*
Total		**1071**	**1022**	**2093**

Table 10. Mental Health Related Diagnosis by Disposition and Year - Afghanistan Jan 2010 to Dec 2011

Diagnosis	Duty restrictions		Evacuated		Total*†	
2010	(n)	(%)	(n)	(%)	(n)	(%)
Anxiety	4	0.5%	2	0.2%	6	0.7%
Mental Health Visit	4	0.5%	0	0.0%	4	0.5%
Sleep Disorder	4	0.5%	0	0.0%	4	0.5%
Insomnia	3	0.3%	0	0.0%	3	0.3%
Adjustment Disorder	2	0.2%	0	0.0%	2	0.2%
Combat Stress Reaction	1	0.1%	0	0.0%	1	0.1%
Drug Psychosis	1	0.1%	0	0.0%	1	0.1%
Stress Reaction	1	0.1%	0	0.0%	1	0.1%
Subtotal	*20*	2.3%*	*0*	0.2%	*22*	*2.6%*
2011						
Anxiety	4	0.4%	0	0.0%	4	0.4%
Adjustment Disorder	2	0.2%	0	0.0%	2	0.2%
Depression	2	0.2%	0	0.0%	2	0.2%
Insomnia	2	0.2%	0	0.0%	2	0.2%
Mental Health Visit	2	0.2%	0	0.0%	2	0.2%
Situational Crisis	1	0.1%	0	0.0%	1	0.1%
Subtotal	*13*	1.4%	*0*	0.0%	*13*	*1.4%*
Total	**33**		**2**		**35**	

*** Percentage in relation to the total number of MH related first-time visits in 2010 (n=859)**
† Percentage in relation to the total number of MH related first-time visits in 2011 (n=943)

Table 11. Number of Total Days Lost by Mental Health Related Diagnosis and Year - Afghanistan Jan 2010 to Dec 2011

Diagnosis	Number of Visits	Number Light Days*	Number Excused Days	Total Days Lost
2010				
Insomnia	3	30	3	18
Mental Health Visit	4	14	2	9
Sleep Disorder	4	12	2	8
Anxiety	4	0	7	7
Drug Psychosis	1	7	0	3.5
Adjustment Disorder	2	0	2	2
Stress Reaction	1	0	1	1
Combat Stress Reaction	1	2	0	1
Subtotal 2010	*20*	*65*	*17*	*49.5*
2011				
Depression	2	180	2	92
Mental Health Visit	2	14	1	8
Adjustment Disorder	2	0	5	5
Insomnia	2	0	5	5
Anxiety	4	4	2	4
Situational Crisis	1	0	1	1
Subtotal 2011	*13*	*198*	*16*	*115*
Total 2010 and 2011	**33**	**263**	**33**	**164.5**

***1 light duty day equals 0.5 day lost**

OP IMPACT (KUWAIT) 2015

Table 12. Number of Non-Mental Health Related Visits* and Mental Health Related Visits by Visit Type – OP IMPACT 2015

Year	First-time Visit	Follow-up Visit	Total	
Non-Mental Health Related Visits*	2882	675	3557	95.5%
Mental Health Related Visits	88	78	166	4.5%
Total	2970	753	3723	**100.0%**

***All other health care visits different from mental health related visits**

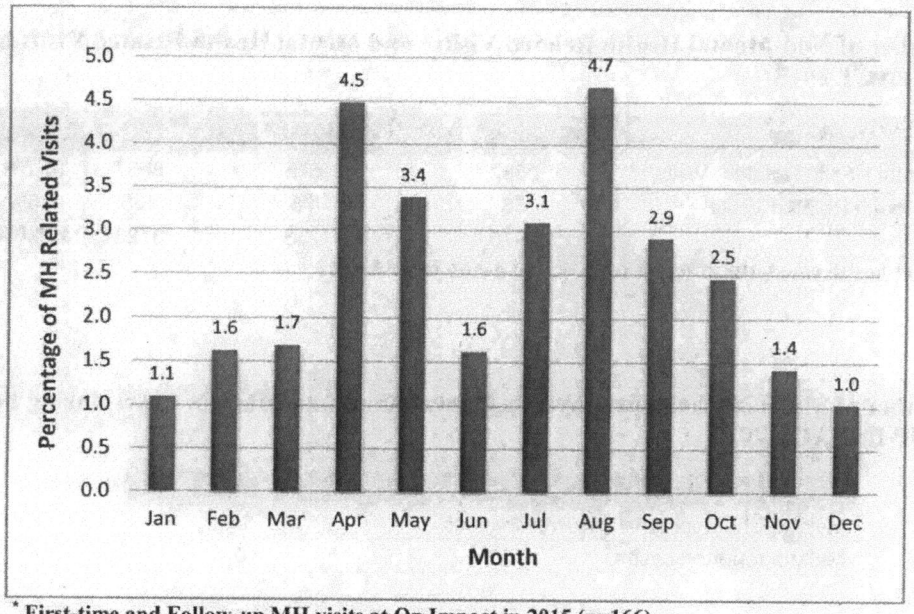
Table 13. Number of Malaria Chemoprophylaxis Prescriptions and Malaria Cases during First-time Visits - OP IMPACT 2015

Year	(n)
Malaria Chemoprophylaxis Prescriptions	15
Malaria reported cases	0

Table 14. Mental Health Related Diagnoses by Visit Type- OP IMPACT 2015

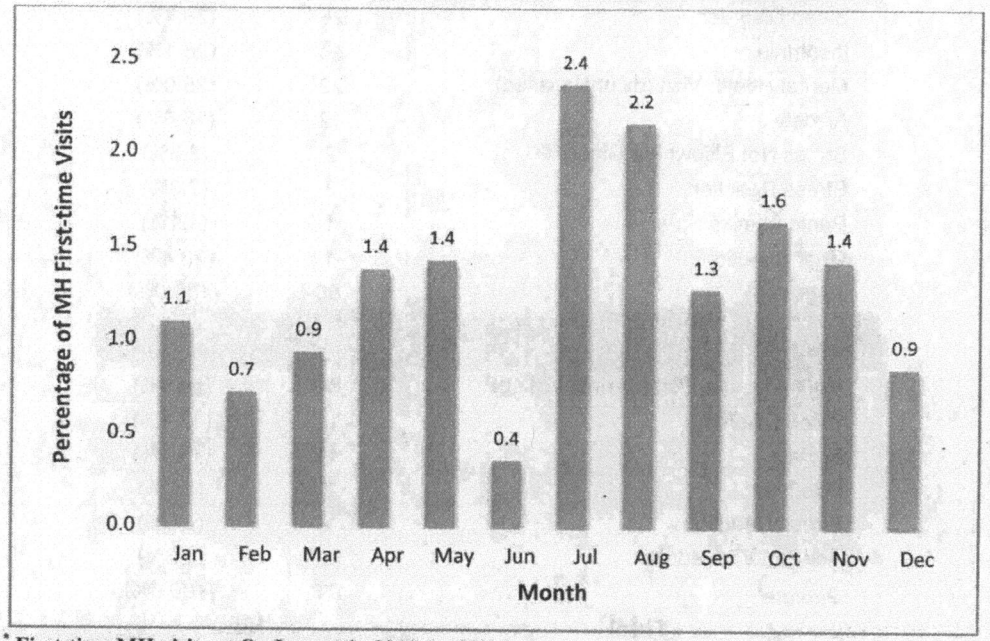
Diagnosis	Total	
First visit	(n)	(%)
Sleep Disorder	25	(28.4%)
Insomnia	23	(26.1%)
Mental Health Visit (dx unspecified)	22	(25.0%)
Anxiety	12	(13.6%)
Stress Not Elsewhere Classified	2	(2.3%)
Stress Reaction	2	(2.3%)
Panic Attacks	1	(1.1%)
Grief Reaction	1	(28.4%)
Subtotal	*88*	*(100.0%)*
Follow-Up Visit		
Mental Health Visit (dx unspecified)	46	(59.0%)
Sleep Disorder	12	(15.4%)
Anxiety	11	(14.1%)
Insomnia	6	(7.7%)
Stress Reaction	2	(2.6%)
Adjustment Disorder	1	(1.3%)
Subtotal	*78*	*(100.0%)*
Total	**166**	

Figure 7. Percentage of All Mental Health (MH) Related Visits in 2015 by Month – OP IMPACT 2015*†



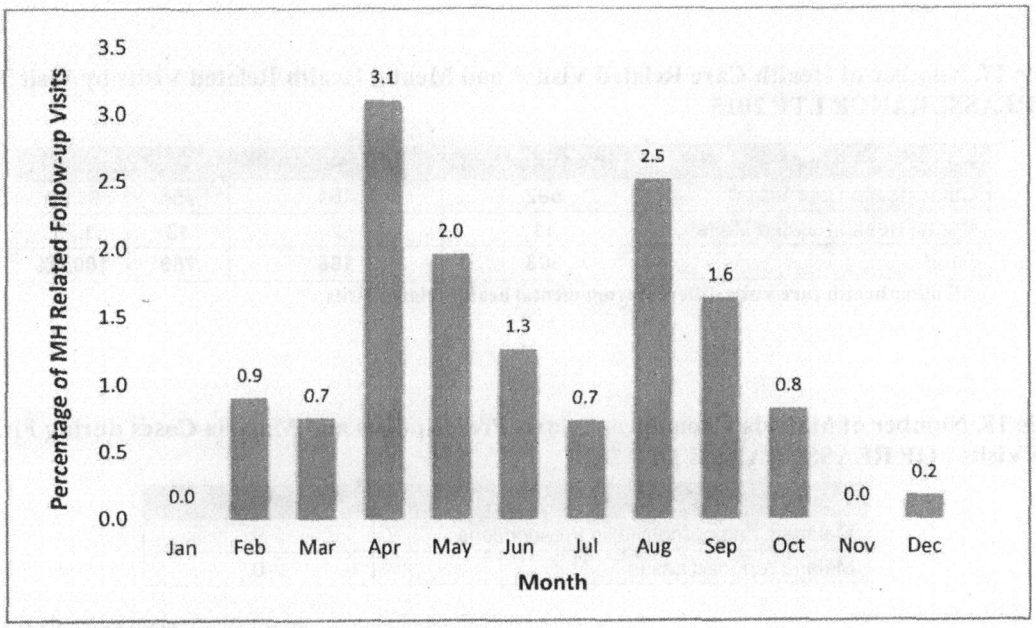
* First-time and Follow-up MH visits at Op Impact in 2015 (n=166)
† CFTPO- DISS annual 2015 denominators database

Figure 8. Percentage of All First-Time Mental Health (MH) Related Visits in 2015 by Month - OP IMPACT*†



* First-time MH visits at Op Impact in 2015 (n=88)
† Percentages based on CFTPO - DISS annual 2015 denominators database

Figure 9. Percentage of Mental Health (MH) Related Follow-up Visits by Month- OP IMPACT 2015*†



*** Follow-up MH visits at Op Impact in 2015 (n=78)**
† Percentages based on CFTPO - DISS annual 2015 denominators database

Table 15. Mental Health Related Diagnosis by Disposition Type OP IMPACT 2015

Diagnosis	Duty restrictions		Evacuated		Total
Anxiety	4	4.5%	0	0.0%	4
Mental Health Visit	2	2.3%	1	1.1%	3
Stress Reaction	2	2.3%	0	0.0%	2
Adjustment Disorder	0	0.0%	1	1.1%	1
Grief Reaction	1	1.1%	1	1.1%	2
Total	**9**	10.2%*	**3**	3.4%*	**12**

*** Percentage in relation to the total number of MH related first-time visits in 2015 (n=88)**

Table 16. Number of Total Days Lost by Mental Health Related Diagnosis - OP IMPACT 2015

Diagnosis	Number of Visits	Number Light Days*	Number Excused Days	Total Days Lost
Anxiety	4	4	5	7
Mental Health Visit	2	2	2	3
Stress Reaction	2	2	2	3
Grief Reaction	1	1	0	0.5
Total	**9**	**9**	**9**	**13.5**

OP REASSURANCE LTF 2015

Table 17. Number of Health Care Related Visits* and Mental Health Related Visits by Visit Type – OP REASSURANCE LTF 2015

Year	First-time Visit	Follow-up Visit	Total	
Other Health Care Visits*	592	164	756	98.3%
Mental Health Related Visits	11	2	13	1.7%
Total	**603**	**166**	**769**	**100.0%**

***All other health care visits different from mental health related visits**

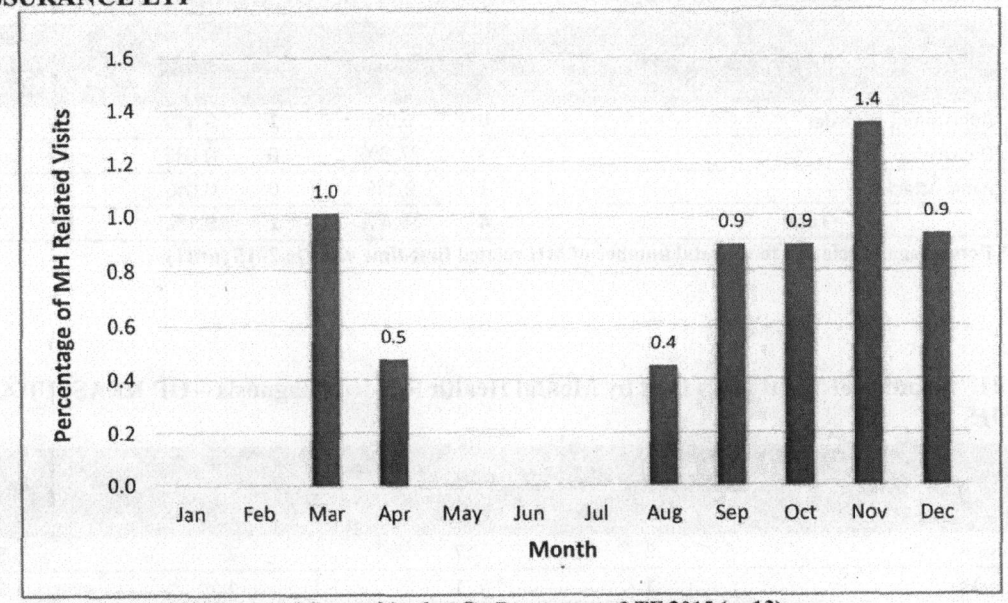
Table 18. Number of Malaria Chemoprophylaxis Prescriptions and Malaria Cases during First-time Visits - OP REASSURANCE LTF 2015

Year	(n)
Malaria Chemoprophylaxis Prescriptions	0
Malaria reported cases	0

Table 19. Mental Health Related Diagnoses by Visit Type- OP REASSURANCE LTF 2015

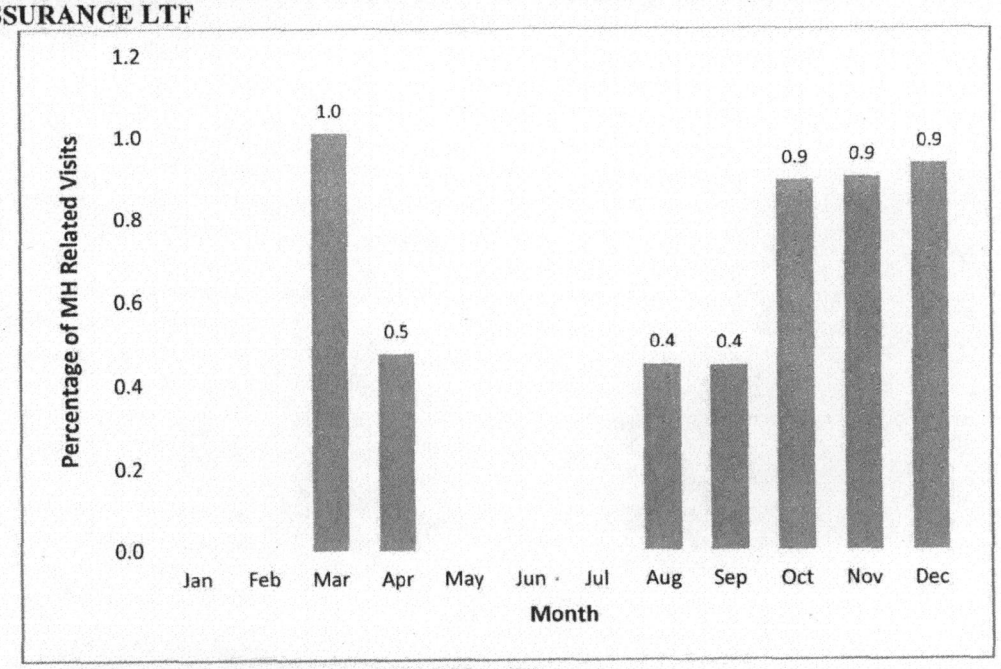
Diagnosis	Total	
First visit	(n)	(%)
Insomnia	5	45.5%
Depression	3	27.3%
Adjustment Disorder	2	18.2%
Panic Attacks	1	9.1%
Subtotal	*11*	*(100.0%)*
Follow-Up Visit		
Panic Attacks	1	50.0%
Adjustment Disorder	1	50.0%
Subtotal	*2*	*(100.0%)*
Total	**13**	

Figure 10. Percentage of All Mental Health (MH) Related Visits in 2015 by Month- OP REASSURANCE LTF*†



*** First-time and Follow-up visits combined at Op Reassurance LTF 2015 (n=13)**
† Percentages based on the CFTPO- DISS annual 2015 denominators database

Figure 11. Percentage of All First-Time Mental Health (MH) Related Visits in 2015 by Month - OP REASSURANCE LTF



*** First-time visits at Op Reassurance LTF 2015 (n=11)**
† Percentages based on the CFTPO- DISS annual 2015 denominators database

Table 20. Mental Health Related Diagnoses by Disposition Type- OP REASSURANCE LTF 2015*

Diagnosis	Duty restrictions		Evacuated		Total
Adjustment Disorder	0	0.0%	1	9.1%	1
Depression	3	27.3%	0	0.0%	3
Panic Attacks	1	9.1%	0	0.0%	1
Total	**4**	**36.4%**	**1**	**9.1%**	**5**

*** Percentage in relation to the total number of MH related first-time visits in 2015 (n=11)**

Table 21. Number of Total Days Lost by Mental Health Related Diagnosis – OP REASSURANCE LTF 2015

Diagnosis	Number of Visits	Number Light Days*	Number Excused Days	Total Days Lost
Depression	3	7	2	5.5
Panic Attacks	1	1	1	1.5
Total	**4**	**8**	**3**	**7**

Annex 1

ICD10 –codes Chapter V Mental and behavioural disorders

F04 to F09	Organic, including symptomatic, mental disorders
F20 to F29	Schizophrenia, schizotypal and delusional disorders
F30 to F39	Mood [affective] disorders
F40 to F48	Neurotic, stress-related and somatoform disorders
F51	Nonorganic sleep disorders
F54	Psychological and behavioural factors associated with disorders or diseases classified elsewhere
F59	Unspecified behavioural syndromes associated with physiological disturbances and physical factors
F61 to F69	Disorders of adult personality and behaviour
F99	Unspecified mental disorder (F99)

ICD10 –codes Chapter VI Diseases of the nervous system

G47	Other sleep disorders

ICD10 –codes Chapter XXI Factors influencing health status and contact with health services

Z00.4	Mental health visit
Z60	Social adjustment problems
Z73.3	Stress not elsewhere classified

ICD10 –codes Malaria chemoprophylaxis, antimalarial review, malaria

Z29.2	Malaria chemoprophylaxis
Z71.9	Antimalarial review
B54	Malaria